IDG.net

# COMPUTERWORLD

THE NEWSPAPER FOR IT LEADERS • WWW.COMPUTERWORLD.COM

OCTOBER 15, 2001 • VOL. 35 • NO. 42 • $5 COPY

# USERS FORCE MICROSOFT'S HAND

## *Licensing, upgrade deadline extended*

BY CAROL SLIWA

Corporate users were happy to learn that Microsoft Corp. last week granted them more time to mull over its controversial volume-licensing and upgrade changes.

But the deadline extension to next July 31 did little to lessen some users' distaste for the new program. Several continued to bristle at the cost of the new Software Assurance upgrade, while others renewed their complaints about the

*Licensing, page 77*

## *Company revamps IT certification programs*

BY CAROL SLIWA

Driven by customer feedback, Microsoft Corp. last week announced plans to recognize its certified professional credentials on an indefinite basis and to add a new category for systems administrators.

The changes are expected to have a significant impact on Microsoft Certified Systems Engineers trained on the Windows NT 4.0 operating system. Their certifications were scheduled to expire

*Certification, page 77*

# IT MANAGERS WARY OF HP/COMPAQ

## *Many users skeptical of merger's benefits*

BY LEE COPELANO
ORLANDO

The embattled CEOs of Hewlett-Packard Co. and Compaq Computer Corp. last week continued to hard-sell the benefits of merging their companies. But many users remained steadfast in their skepticism.

IT managers consistently cited a range of problems with each company that didn't add up to better hardware options, support services or targeted development efforts.

"It's like going to a grocery store that sells everything under the sun," said Donna Lorch, vice president of computer services at Kitchell Corp., a subsidiary of $9 billion German constructioo giant Hochtief AG. "You still shop

*HP/Compaq, page 16*

NEWSPAPER

$BXBBJFT$ $$$$$$$$CAR-RT LOT$$B-052
$48106UIZ904PB005$ OCT 01 001 8300
U M I 106
PO BOX 904 39-3
ANN ARBOR MI 48106-0904

ALLEN CRAWFORD/PLANKTON ART

KNOWLEDGE CENTER

# SMART STORAGE

SPECIAL REPORT

DATA PACK RATS threaten to overwhelm the storage capacity and resources of the IT departments in every organization. Our collection of articles will help IT managers make intelligent technology decisions and avoid the 12 most costly mistakes in storage management.

*Special Report begins on page 35.*

Quick Links

Check out the following stories in our online Storage Knowledge Center: www.computerworld.com/q?k1700

■ Figure out the "information flows" and future storage needs of the business before making technology selections. ■ The wave of the future: A high-fiber (storage) diet. ■ InfiniBand may displace the storage interconnect infrastructure in late 2003. ■ Holographic storage is on the horizon.

## The coveted five nines. In the past, only a precious few were allowed to see them.

99.999% uptime. For a server operating system, it's a measure of reliability that translates into just over five minutes of server downtime per year.* For your business, that means servers are up and running when people need them. Of course, rumors of this 99.999% uptime usually start under ideal lab conditions. But where are these five nines when your business needs them? If you're using Microsoft® Windows® 2000 Server–based solutions, they may be closer than you think. Today Starbucks, FreeMarkets and MortgageRamp, an affiliate of GMAC Commercial

Windows 2000 Server Family

*This level of availability is dependent on many factors outside of the operating system, including other hardware and software technologies, modern-ethical operational processes and professional services. © 2001 Microsoft Corporation. All rights reserved. Microsoft, Windows, and the Windows logo are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. The names of actual companies and products mentioned herein may be the trademarks of their respective owners.

Mortgage, are using Windows 2000 Server–based systems designed to deliver 99.999% server uptime. Of course, not all installations require this level of reliability, but one thing is for sure: The Windows 2000 Server family can help you get to the level of reliability you need. In fact, industry leaders such as Compaq, Dell, Hewlett-Packard, IBM, Unisys, Stratus and Motorola Computer Group can work with you to deliver solutions with up to five nines uptime. To learn more about server solutions you can count on, visit **microsoft.com/windows2000/servers** Software for the Agile Business

Microsoft®

**ca smart Program Guideline:**

The ca smart logo is only to be used by CA partners for innovative eBusiness products or solutions on which CA technology resides, is a component of, or is otherwise integrated. Which would not include sporting goods. For more information, visit ca.com/casmart.

ca Computer Associates™

©2001 Computer Associates International Inc. (CA) All trademarks, trade names, service marks, and logos referenced herein belong to their respective companies.

# COMPUTERWORLD THIS WEEK

## NEWS 6

**6 Terrorist threats** raise concerns about trusting insiders who have access to sensitive systems.

**7 U.S. firms** scale back plans for offshore software development, citing safety issues and general uncertainty.

**8 Security-focused** users search for ways to ensure that software vendors make better products.

**10 Fairmont Hotels** outlines a novel plan to become its own ASP and ISP.

**12 A Microsoft initiative** to support Java development on Windows platforms may be too little, too late.

**16 Office Depot's** wireless strategy is raising eyebrows. The company has rolled out a massive Palm system but also cozied up to Microsoft's Pocket PC.

### OPINIONS


Patricia Keefe . . . . 32
Pimm Fox . . . . 32
Dan Gillmor . . . . 33
Frank Hayes . . . . 78

Editorial/Letters . . . . 32, 33
How to Contact CW . . . . 76
Company Index . . . . 76
Shark Tank . . . . 76


## ONLINE

### The Case for Open File Formats

Sun Microsystems Inc. CEO Scott McNealy argues the case for using XML to store document and spreadsheet data.
**www.computerworld.com/community/os**

### Emerging Company: Yipes

This week's profiled firm brings high-speed network connectivity to the corporate doorstep.
**www.computerworld.com/q?23850**

**Quick Link** For breaking news, updated twice daily at noon and 5 p.m., visit the *Computerworld.com* Web site:
**www.computerworld.com/q?q4000**

SPECIAL REPORT

## KNOWLEDGE CENTER: STORAGE

### 35 Smart Storage

This month's Knowledge Center special report is intended to help you cope with the confusing array of technologies for wrestling with storage requirements that seem to double every year. The following stories are intended to help you make smart choices and avoid common pitfalls.

### 36 The Data Squeeze

Users need to squeeze more data onto existing storage systems, but storage management tools are still in their infancy. Plus, you also really need a "policy engine."

**ONLINE:** What will the HP/Compaq merger mean for storage?
**www.computerworld.com/q?23832**

### 42 A Storage Sketchbook

Five diagrams trace the evolution of storage topologies from simple client/server storage to complex storage-area networks. Plus a glossary of some of the more arcane terms.

### 44 Oops!

A storage consultant identifies the 12 biggest storage mistakes — and how to avoid them.

### 48 What's After Fibre Channel?

Fibre Channel is still young, but it's already in danger of being eclipsed by alternative technologies for storage connectivity. Most are still in development, a few are showing up in the market, and all have advantages — and disadvantages.

**ONLINE:** InfiniBand is likely to displace a lot of storage interconnect infrastructure when it begins to hit the market in volume in 2003.
**www.computerworld.com/q?23703**

### 50 Tons of DNA Data

For biotech information companies such as Celera Genomics Corp. and DoubleTwist Inc., a staggering amount of storage is just part of doing business.

### 52 The Hunt for Storage Skills

A lack of widely accepted, vendor-neutral training and the rapid pace of storage technology advancement mean IT people with deep storage know-how like Jesse Gilleland are scarce.

### 54 One Tough Business

Storage service providers had hoped companies would push their online data off-site. When that didn't happen, they shifted to the remote managed storage approach. But IT managers remain cautious.

### 58 Managing the Data Pack Rats

Faced with haphazard storage of vast quantities of electronic records, IT managers are finally teaming up with professional records managers to figure out what to keep and for how long.

### 60 Drowning in E-Mail?

Managing and organizing e-mail and its attachments are major back-end storage problems unless, like Boeing, you apply strict rules on users.

### Also in This Week's Knowledge Center:

**62 QuickStudy:** Take a peek at the guts of a hard disk, and learn the difference between *disc* and *disk*.

**64 Review:** There have never been more options for removable storage and PC backup than there are now. *Computerworld*'s reviews editor looks at a few new devices.

**66 Nicholas Petreley says,** "I told you so." We're still trying to reinvent the centralized mainframe model for storage.

WWW.COMPUTERWORLD.COM

Quick Link

### First Things First

Consultants at EMC say it's vital to figure out the information flows and future storage needs of an enterprise before selecting a technology. Picking the technology first may be a big mistake. Read the interview at:
**www.computerworld.com/q?23873**

### High-Fiber Diet

A high-fiber network — plus storage over IP — equals a storage system that will work well into the future. The fiber is necessary for the throughput and security requirements of the business.
**www.computerworld.com/q?23881**

### Holographic Imaging

The data requirements of tomorrow's enterprise demand a radical rethinking of storage and media. Holographic imaging, first proposed in the early 1960s, is finally showing signs of maturing into a viable technology.
**www.computerworld.com/q?23882**

## AT DEADLINE

### HP Out, SunGard In For Comdisco Unit

Rosemont, Ill.-based Comdisco Inc. dropped a deal to sell its IT services business to Hewlett-Packard Co. and agreed to a higher offer from Wayne, Pa.-based SunGard Data Systems Inc. The sale still needs to be approved by the judge overseeing Comdisco's Chapter 11 bankruptcy proceedings, however. HP said it plans to object to the $825 million deal at a court hearing next week.

### i2, Yantra Ready Supply Chain Tools

Supply chain software vendors i2 Technologies Inc. and Yantra Corp. are preparing to roll out rival applications for managing complex order-fulfillment processes. Dallas-based i2 plans to announce new tools next week. Towksbury, Mass.-based Yantra will release an upgrade of its software today.

### House Panel Eyes New Privacy Rules

The U.S. House Committee on Energy and Commerce proposed a framework for future data privacy regulations that would require companies to post privacy notices and give customers the ability to opt out of sharing their personal information. However, the proposal would also preempt state-level laws and limit the ability of individuals to sue companies on privacy grounds.

### ASP Gets $100M Funding Commitment

Struggling application service provider (ASP) USInternetworking Inc. said it signed a deal for a $100 million cash infusion from Bain Capital Inc. in Boston. Andrew Stern, CEO of Annapolis, Md.-based USInternetworking, said Bain's equity investment is meant to address "financial viability concerns that have limited our growth."

# Analysts: Insiders May Pose Security Threat

*Employees with access to IT systems may have opportunity to create havoc*

BY DAN VERTON

As intelligence and security officials sift through mountains of intelligence data about new terrorist threats in the wake of U.S. retaliatory strikes against terrorist targets in Afghanistan, cybersecurity experts are urging companies to change the way they think about enterprise security.

The Sept. 11 attacks on the U.S. had little impact on critical government and business networks. But any future attacks against U.S. companies, which own and operate most of the nation's critical infrastructure systems, may be different. And company insiders — employees with access to IT systems — pose a particular threat, security experts warn.

"Everyone's security policies will have to be re-examined in light of Sept. 11," said Steven Aftergood, a defense and intelligence analyst at the Federation of American Scientists in Washington.

"Scenarios that might have seemed improbable and far-fetched will need to be reconsidered," he said. "Background investigations of key personnel may be a part of the response."

As U.S. retaliatory actions continue, the government is worried about a wide range of possible future threats to private infrastructure from individuals who may already be in this country legally, said Vince Cannistraro, former chief of counterintelligence at the CIA.

"The FBI believes there is a significant threat to infrastructure in the U.S., especially since they have been unsuccessful in identifying and locating presumed members of at least two five-person cells that remain at large," he said.

The government's concern stems from the lack of information on the number of terrorist support cells and sympathizers who may have entered the U.S. during the past five years. Over the course of its investigation, the FBI has detained 614 people and recently narrowed its focus to 220 of them. But terrorism experts claim that there may be many others who aren't on anyone's radar screen.

### A Blind Eye

Winn Schwartau, an information warfare specialist and president of Interpact Inc. in Seminole, Fla., said companies and government agencies, particularly the U.S. Department of Defense (DOD), have in the past turned a blind eye toward the number of foreign nationals who have been granted administrative access to sensitive networks without a proper background investigation.

Schwartau has briefed corporate CEOs and senior generals at the Pentagon about the problem, but most have been unwilling to tackle the issue because of political sensitivities, he said.

The problem in government has been compounded by software glitches in the system used by the Defense Investigative Service to manage security clearance investigations. The software problems last year caused a logjam of 600,000 pending investigations.

The number of pending cases as of Oct. 5 was 262,000, involving both civilian and military personnel, a DOD spokesman said last week. The department expects to eliminate the backlog by next September, he said.

Nonetheless, security experts agreed that the internal threat is real. Disgruntled employees and other insiders with legitimate access to critical business networks accounted for more than 80% of the cyberattacks against companies last year, according to a survey conducted by the FBI and the San Francisco-based Computer Security Institute.

Jim Williams, director of security solutions at Solutionary Inc., a managed security services firm in Omaha, said that it's important that companies train and educate their employees about the rules governing network access.

Since Sept. 11, awareness has increased, as have efforts to beef up building security, said Williams, who has also served as a member of the FBI's San Francisco Computer Crime Squad.

"There's a realization under way that you can't have network security without physical security," said Williams. You have to know that the people coming into your company are supposed to be there and are authorized to be on your network, he said.

## Threat From Within

*Security experts say you should take the following measures to guard against the internal threat to sensitive systems:*

- Develop and publish access policies that can be used as a basis for punishment or prosecution.
- Develop training and education programs for all employees.
- Conduct background investigations on employees and contractors who have access to sensitive systems.
- Classify corporate information, and control employees' access based on their need to know or role.
- Segment networks, where possible.
- Deploy monitoring tools with automated alert mechanisms.
- Demand that trading partners and service providers inform you of the security protections in place at their facilities.
- Control physical access to buildings and offices; automate the logging of physical access and integrate it with network-access monitoring.

## Insider-Damage Assessment

*A chronology of high-profile internal IT security breaches:*

**1985** A brokerage firm clerk alters computer records and changes the ownership and price of 1,700 shares of Loren Industries stock.

**1988** A former employee of Southeastern Color Lithographers Inc. destroys billing and account information worth $400,000.

**1996** A computer operator at Reuters Group PLC in Hong Kong sabotages the dealing systems for five investment-bank clients.

**1997** A temporary employee working as a computer technician at *Forbes* magazine is charged with crashing the company's network and causing more than $100,000 in damage.

**1998** A disgruntled programmer at defense contractor Omega Engineering Corp. sets off a digital bomb, destroying $10 million in data.

**2001** Robert Hanssen, a career FBI agent with access to counterintelligence databases, is charged with spying for Russia since 1985.

# Users Delay Offshore Programming in Wake of Attacks

*Uncertainties, travel concerns stall plans*

BY JAIKUMAR VIJAYAN

Companies that were planning to outsource work to offshore software development firms are delaying their decisions or scaling back projects following the Sept. 11 terrorist attacks, according to software executives in India.

Concerns about travel safety, combined with an overall sense of geopolitical uncertainty following the events, are helping to fuel such decisions.

Also playing a significant role is the overall U.S. economic slowdown, which had already contributed to a decline in the amount of work being outsourced to Indian companies before Sept. 11.

The delays are coming from all industry segments, said Indian software executives. But not surprisingly, companies that are pushing back outsourcing decisions the most following the attacks have been concentrated in the airline, insurance and financial services sectors, said Rusi Brij, CEO of software development and training firm Aptech Ltd. in Princeton, N.J.

"Decision-making has more or less completely stopped" when it comes to closing new deals with U.S clients in these industries, Brij said. Several deals that Aptech was negotiating with airlines "have been put on hold indefinitely" because of the travel slowdown following the attacks, he added.

Like many other Indian IT industry executives, Brij said he doesn't expect the fallout from the attacks to have a drastic impact on existing contracts, although some customers have announced plans to scale back spending next year.

Last month, Aptech had to bench more than 10% of its 150 employees working on-site at U.S locations, its biggest furlough for any month this year. And many Indian companies expect their on-site staff in the U.S to be scaled back dramatically because of the slowdown in IT spending industrywide.

But the biggest post-Sept 11. challenge for offshore programming firms is simply getting new U.S clients to sign up for services, said Rama Raju, managing director of Hyderabad, India-based Satyam Computer Services Ltd.

For instance, in the aftermath of the attacks, it has become virtually impossible for Satyam to get U.S executives to travel to India to check out his company's development facilities and infrastructure, due to safety concerns. In the past, such firsthand inspections of Satyam's facilities have been crucial to convincing users to sign with the company, Raju said.

"We believe that we can bank on existing relationships in the short term, and hopefully, once the confidence level goes up, we'll start getting new customers," he said.

The events of Sept. 11 have also impacted other types of software subcontracting.

Clear Course Inc., a developer of educational software in Provo, Utah, outsources software development to offshore companies via a U.S-based intermediary. After the attacks, Clear Course instructed the intermediary not to subcontract its work to companies in Pakistan "or any country that supports terrorism," said Winstoo Lee, an executive vice president at the company.

## Visa Problems Could Arise

There's uncertainty about how the events of Sept. 11 will impact the ability of offshore programming houses to obtain the visas needed to send workers to U.S client locations on relatively short notice, according to Rob Linder, CEO of Providio Technology Group LLC, a Boston-based IT services firm.

The ability to quickly ramp up staffing levels when needed has been a major selling point for Indian software companies. But the tighter immigration scrutiny and visa issuance guidelines that are expected to result from the attacks could make this sort of staff augmentation harder to accomplish, Linder cautioned.

So far, there have been no obvious travel restrictions to the U.S., said Rama Raju, managing director of Satyam Computer Services in India. But like Linder, he said he expects regulations to get tougher. As a result, Satyam is planning to move more of its work offshore and to ramp up its telecommunications and videoconferencing capabilities for interacting with U.S.-based clients.

*– Jaikumar Vijayan*

# Companies Urged to Revisit Disaster Recovery Plans

BY LEE COPELAND, CAROL SLIWA AND MATT HAMBLEN

ORLANDO

The heightened threat of terrorist attacks in the wake of the Sept. 11 assaults is forcing U.S.-based companies to augment their disaster recovery plans with crisis management maneuvers, according to users at the Gartner Symposium/ITxpo here last week.

Among those new concerns are businesses' proximity to potential terrorist targets such as large government offices or power-producing facilities, the psychological impact on employees and the long-term physical impediments to conducting normal business operations.

Ron Stephenson, vice president of informatioo systems research and development at Downey Savings and Loan Associatioo FA in Newport Beach, Calif., said federal regulations dictate that his company back up its systems, leading it to focus on systems and software in plotting a disaster recovery plan. The association even has its own disaster recovery site about 65 miles from Newport Beach, where a mainframe serves as a fully functioning backup for its main systems.

"We back up everything — everything," Stephenson said. "The tapes are picked up every day and stored off-site." But he said he recognized the need to "focus more on the people first," after attending a town meeting on disaster recovery.

"We have processes to get data from one place to another, hut if you can't get the people over there, the data and the software doesn't do any good," Stephensoo said. "It's the nontechnical things that I think need to be completely revisited."

Some users are worried that their proximity to potential terrorists targets could present a danger to business operations.

David Creekmore, director of IT at the Corporation for Public Broadcasting, said the company is rethinking its crisis preparedness and cited its location as a concern. The Washington-based nonprofit company is across the street from an FBI huilding, prompting Creekmore to consider moving backup IT systems offsite, he said.

"We always had something in place," said Creekmore. "But now we're thinking about extended disruptions, people evacuation plans and beefing up our backup abilities."

Establishing the means to communicate with dispersed staff prior to a crisis should also be a priority, said Rich Mogul, an analyst at Stamford, Conn.-based Gartner Inc. Mogul and other Gartner analysts suggested setting up communication protocols such as emergency corporate Web sites where workers can check in or toll-free phone numbers for emergency contacts.

> Now we're thinking about extended disruptions, people evacuation plans and beefing up our backup abilities.
>
> DAVID CREEKMORE, DIRECTOR OF IT, CORPORATION FOR PUBLIC BROADCASTING

A CIO at a Boston-based financial services company said he's concerned about whether he will be required to pay for software copies to run systems in his disaster recovery hot site, since it will only be used when corporate servers are down.

Some software companies don't charge for this capability, analysts said, because the software isn't being fully utilized at disaster recovery sites.

"I get the impression this is negotiable for some but wasn't sure what the industry practice is," said the CIO, who asked not to be identified.

Relying on older, concurrent-license pricing plans, which would allow a user in a backup facility to use software at the same price when a primary facility is down, may be an option, said Donna Scott, a Gartner analyst. "This might not work with tier-based pricing," she added.

Another user suggested that workers and employers work together to beef up IT infrastructures to make working from home easier. Letting employees work from home would allow businesses to continue operating despite uncertainties, the user said.

# Attacks Prompt Debate Over Software Security

## *Should vendors be held accountable?*

BY PATRICK THIBODEAU

SOFTWARE SECURITY standards are virtually nonexistent, and resistance to them is certain to be stiff. But the threat of terrorist-related cyberattacks has prompted new debate on whether software makers can be forced to make better products.

End users and security experts want better products, especially after the Sept. 11 attacks on the U.S. and subsequent warnings about computer infrastructure security.

However, unlike cars, which are required to meet government safety standards, or new drugs, which aren't released until fully tested, software faces no such review.

"Immunity breeds no responsibility," said Michael Rustad, who heads the high technology law program at Suffolk University Law School in Boston. He added that the Uniform Computer Information Transaction Act (UCITA), if widely adopted by states, would hurt warranty protections. UCITA has been adopted in Virginia and Maryland.

"There needs to be some kind of remedy for software failure, especially when it comes to security," Rustad said.

But there is no consensus on what could be done to get software vendors to improve product security.

Government agencies have tried to define security standards and features, but those efforts can't overcome the complexity of interconnected systems, said Richard Pethia, director of the CERT Coordination Center at Carnegie Mellon University in Pittsburgh.

"It's not that those products lack the right features, it's that they fall down in the implementation," he said. "On the other hand, 'there are bugs in the software,' he added.

One solution is to give software developers more training on security, said Eburn Fox, a security planning and architecture manager at the Bank of Hawaii in Honolulu.

"A lot of the problem comes from programmers not having an understanding of the security piece when they are writing code," said Fox.

William Wulf, president of the Washington-based National Academy of Engineering and a computer security expert, said entirely new approaches to software development are needed to replace the idea of a Maginot line or a perimeter-focused system of protection with a more distributed security system. "Instead of having this perimeter defense, you have lots of agents running around seeing if something bad is happening and attacking when it does," said Wulf.

Trying to improve software through increased liability won't necessarily work, argued Wulf. "I don't believe it's possible to build a secure system," he said, wondering how vendors can be liable for "something that can't be done."

The ultimate punishment for bad software, said Harris Miller, president of the Information Technology Association of America in Arlington, Va., is an end-user decision not to buy a particular product. "Failures in the marketplace can lead to extraordinary punishment," he said.

### In Need of Brains

*Congress was warned last week that the U.S. isn't producing enough Ph.D.s in computer security. Eugene Spafford, a computer science professor who heads Purdue University's information assurance center, compiled these statistics:*

- Only 20 Ph.D.s in computer security were granted in the past three years, according to a survey of 23 universities that grant such degrees.
- A federal agency that awards money for critical infrastructure protection doled out $5 million this year — enough to fund just nine of 133 projects proposed.

**ONE SOLUTION:** Increased research funding, as well as a promise to sustain that research over many years, will encourage more people to seek advanced degrees.

# Antitrust Mediator Faces Daunting Task

BY PATRICK THIBODEAU

Microsoft Corp. and the government continued antitrust settlement talks into late Friday but were still expected to seek help from a mediator.

Most legal experts believe the odds of reaching an agreement remain long and said a new referee in the six-year court battle may have no more luck than the last mediator did.

U.S. District Judge Colleen Kollar-Kotelly ordered the two sides to try to settle the case on their own by last Friday. If they couldn't, they were due to designate an agreed-upon individual to act as a mediator, who would have until Nov. 2 to negotiate an agreement.

The new mediator would follow in the footsteps of U.S. Court of Appeals Judge Richard A. Posner, a highly regarded jurist who failed to bring the two sides together in 1999.

### Coming Up

**NOV. 2**

- Deadline for settlement

**DEC. 7**

- Government to detail proposed remedy and witness list.

**MARCH 11**

- Remedy hearings to begin

"If [Posner] couldn't get these guys to settle, it's very unlikely that someone else could," said Steven Newborn, an attorney at Clifford Chance Rogers & Wells in Washington. "No one can bet on the fact that Microsoft is fatally going to find religion."

The vendor last week lost one potential avenue of escape from its antitrust woes when the Supreme Court rejected its appeal of part of the June U.S. Court of Appeals decision to uphold a lower court ruling that the company engaged in illegal practices to maintain its monopoly in PC operating systems. Microsoft wanted the Supreme Court to throw out the lower court's findings because of critical public comments made by the former judge in the case, Thomas Penfield Jackson.

But the Supreme Court decision doesn't change the legal prospects for Microsoft as it faces the remedy phase before Kollar-Kotelly, said Yee Wah Chin, an antitrust attorney at Mintz Levin Cohn Ferris Glovsky and Popeo PC in Washington. There "hasn't been a change in the overall incentives to settle," she said.

With Posner, Microsoft was facing the possibility of a breakup if it failed to settle. The U.S. Department of Justice now says it won't break up the company. But since the Posner negotiations, Microsoft has been found to be a monopoly. These decisions "offset one another," Chin argues.

A mediator could become irrelevant to the warring parties or an instrument for settlement. But the mediator's ability is limited; the terms of a settlement are "not really within his control," said Chin.

Ken Wasch, president of the Software & Information Industry Association, a trade group in Washington that has backed the government's case, is also doubtful of a settlement. "This isn't like criminal plea bargaining" where "there is a clear advantage to the defendant taking a settlement," he said.

"The company has successfully postponed the day of reckoning," said Wasch, "because the alternative is clearly worse."

**Quick Link** For more information, head to our Microsoft antitrust special focus page
www.computerworld.com/q?s1100

### Corrections

Some specifications for Mobitex technology were listed incorrectly in a chart accompanying a Sept. 17 Knowledge Center story on wireless networks. The Mobitex service is digital, runs at 8K bit/sec., has low latency and offers continuous connectivity. The corrected chart can be read online at *www.computerworld.com/itresources/rcstory/0,4167,STO63949_KEY68,00.html*.

A Sept. 17 review of Research In Motion Ltd.'s BlackBerry 957 wireless device indicated it couldn't handle e-mail attachments. However, with the aid of third-party wireless services or server-based software, attachments can be read on the BlackBerry 957.

# Attacks Prompt Debate Over Software Security

## *Should vendors be held accountable?*

BY PATRICK THIBODEAU
WASHINGTON

SOFTWARE SECURITY standards are virtually nonexistent, and resistance to them is certain to be stiff. But the threat of terrorist-related cyberattacks has prompted new debate on whether software makers can be forced to make better products.

End users and security experts want better products, especially after the Sept. 11 attacks on the U.S. and subsequent warnings about computer infrastructure security.

However, unlike cars, which are required to meet government safety standards, or new drugs, which aren't released until fully tested, software faces no such review.

"Immunity breeds no responsibility," said Michael Rustad, who heads the high technology law program at Suffolk University Law School in Boston. He added that the Uniform Computer Information Transaction Act (UCITA), if widely adopted by states, would hurt warranty protections. UCITA has been adopted in Virginia and Maryland.

"There needs to be some kind of remedy for software failure, especially when it comes to security," Rustad said.

But there is no consensus on what could be done to get software vendors to improve product security.

Government agencies have tried to define security standards and features, but those efforts can't overcome the complexity of interconnected systems, said Richard Pethia, director of the CERT Coordination Center at Carnegie Mellon University in Pittsburgh.

"It's not that these products lack the right features, it's that they fall down in the implementation," he said. On the other hand, "there are bugs in the software," he added.

One solution is to give software developers more training on security, said Faburn Fox, a security planning and architecture manager at the Bank of Hawaii in Honolulu.

"A lot of the problem comes from programmers not having an understanding of the security piece when they are writing code," said Fox.

William Wulf, president of the Washington-based National Academy of Engineering and a computer security expert, said entirely new approaches to software development are needed to replace the idea of a Maginot line or a perimeter-focused system of protection with a more distributed security system. "Instead of having this perimeter defense, you have lots of agents running around seeing if something bad is happening and attacking when it does," said Wulf.

Trying to improve software through increased liability won't necessarily work, argued Wulf. "I don't believe it's possible to build a secure system," he said, wondering how vendors can be liable for "something that can't be done."

The ultimate punishment for bad software, said Harris Miller, president of the Information Technology Association of America in Arlington, Va., is an end-user decision not to buy a particular product. "Failures in the marketplace can lead to extraordinary punishment," he said.

### In Need of Brains

***Congress was warned last week that the U.S. isn't producing enough Ph.D.s in computer security. Eugene Spafford, a computer science professor who heads Purdue University's information assurance center, compiled these statistics:***

- Only 20 Ph.D.s in computer security were granted in the past three years, according to a survey of 23 universities that grant such degrees.
- A federal agency that awards money for critical infrastructure protection doled out $5 million this year — enough to fund just nine of 133 projects proposed.

**ONE SOLUTION:** Increased research funding, as well as a promise to sustain that research over many years, will encourage more people to seek advanced degrees.

# Antitrust Mediator Faces Daunting Task

BY PATRICK THIBODEAU
WASHINGTON

Microsoft Corp. and the government continued antitrust settlement talks into late Friday but were still expected to seek help from a mediator.

Most legal experts believe the odds of reaching an agreement remain long and said a new referee in the six-year court battle may have no more luck than the last mediator did.

U.S. District Judge Colleen Kollar-Kotelly ordered the two sides to try to settle the case on their own by last Friday. If they couldn't, they were due to designate an agreed-upon individual to act as a mediator, who would have until Nov. 2 to negotiate an agreement.

The new mediator would follow in the footsteps of U.S. Court of Appeals Judge Richard A. Posner, a highly regarded jurist who failed to bring the two sides together in 1999.

### Coming Up

**NOV 2**
- Deadline for settlement

**DEC 7**
- Government to detail proposed remedy and witness list.

**MARCH 11**
- Remedy hearings to begin

"If [Posner] couldn't get these guys to settle, it's very unlikely that someone else could," said Steven Newborn, an attorney at Clifford Chance Rogers & Wells in Washington. "No one can bet on the fact that Microsoft is finally going to find religion."

The vendor last week lost one potential avenue of escape from its antitrust woes when the Supreme Court rejected its appeal of part of the June U.S. Court of Appeals decision to uphold a lower court ruling that the company engaged in illegal practices to maintain its monopoly in PC operating systems. Microsoft wanted the Supreme Court to throw out the lower court's findings because of critical public comments made by the former judge in the case, Thomas Penfield Jackson.

But the Supreme Court decision doesn't change the legal prospects for Microsoft as it faces the remedy phase before Kollar-Kotelly, said Yee Wah Chin, an antitrust attorney at Mintz Levin Cohn Ferris Glovsky and Popeo PC in Washington. There "hasn't been a change in the overall incentives to settle," she said.

With Posner, Microsoft was facing the possibility of a breakup if it failed to settle. The U.S. Department of Justice now says it won't break up the company. But since the Posner negotiations, Microsoft has been found to be a monopoly. These decisions "offset one another," Chin argues.

A mediator could become irrelevant to the warring parties or an instrument for settlement. But the mediator's ability is limited; the terms of a settlement are "not really within his control," said Chin.

Ken Wasch, president of the Software & Information Industry Association, a trade group in Washington that has backed the government's case, is also doubtful of a settlement. "This isn't like criminal plea bargaining" where "there is a clear advantage to the defendant taking a settlement," he said.

"The company has successfully postponed the day of reckoning," said Wasch, "because the alternative is clearly worse."

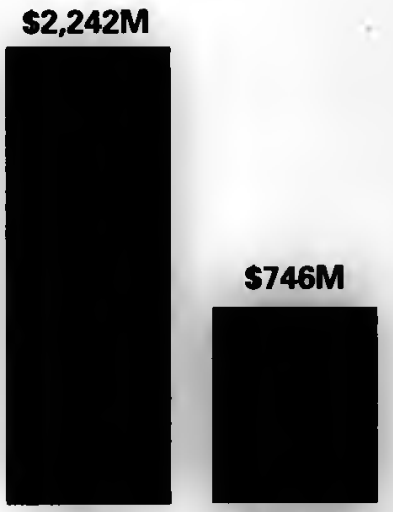
**Quick Link** For more information, head to our Microsoft antitrust special focus page.
www.computerworld.com/q?s1100

### Corrections

Some specifications for Mobitex technology were listed incorrectly in a chart accompanying a Sept. 17 Knowledge Center story on wireless networks. The Mobitex service is digital, runs at 8K bit/sec., has low latency and offers continuous connectivity. The corrected chart can be read online at *www.computerworld.com/itresources/rcstory/0,4167,STO63949_KEY68,00.html.*

A Sept. 17 review of Research In Motion Ltd.'s BlackBerry 957 wireless device indicated it couldn't handle e-mail attachments. However, with the aid of third-party wireless services or server-based software, attachments can be read on the BlackBerry 957.

# Oracle E-Business Suite uses the Internet to save money not spend it




**Using our E-Business Suite, we saved $1 Billion in good times, preserved profits in tough times.**

ORACLE
SOFTWARE POWERS THE INTERNET

**Oracle Corporation latest quarterly results Jun – Aug 2001**

**oracle.com**

Copyright © 2001 Oracle Corporation. All rights reserved. Oracle is a registered trademark, and Software Powers the Internet is a trademark or registered trademark of Oracle Corporation.
Other names may be trademarks of their respective owners.

# BRIEFS

## Postal Service Gives Compaq New Contract

**The U.S. Postal Service awarded Compaq Computer Corp. a five-year contract to be its sole supplier of Windows-based PCs and servers, continuing an arrangement that began with a now-expiring deal signed in 1994. Compaq said the new contract, which also covers IT services, has an expected value of about $1 billion and includes options that could extend the deal to 10 years.**

## CA Layoffs Pare Workforce by 5%

**Computer Associates International Inc. laid off about 900 employees, reducing the software vendor's workforce by 5% and leaving approximately 17,000 people on its payroll. CEO Sanjay Kumar said the cutbacks "reflect the complex realities" that the Islandia, N.Y.-based company and other technology vendors are facing under current economic conditions.**

## WebMD to Appeal Privacy Case Order

**Health care information provider WebMD Corp. said it plans to appeal a preliminary injunction issued last spring forcing it to continue delivering medical claims data to a company that does data mining for pharmaceutical makers. Elmwood Park, N.J.-based WebMD and Durham, N.C.-based Quintiles Transnational Corp. had been trying to settle their privacy-related dispute.**

## Short Takes

**HEWLETT-PACKARD CO. said it plans to start bundling intrusion-detection software with its HP-UX operating system. . . . An online auction of $30 million worth of software licenses owned by defunct retailer MONTGOMERY WARD LLC has begun and is scheduled to continue through Oct. 25 as part of a plan announced in August.**

# Hotel Chain Becomes Its Own Service Provider

*Fairmont breaks mold with in-house ASP, ISP services to gain competitive edge*

BY BOB BREWIN

FAIRMONT Hotels & Resorts Inc. is taking an unorthodox, if not leading-edge, approach to maintaining its $30 million to $40 million IT budget this year, despite the sharp downturn in lodging industry revenues following the Sept. 11 attacks on the U.S.

Unlike many of its competitors, who outsource most of their IT infrastructure support to third parties, the Toronto-based hotelier is reinvesting most of that capital to develop its own application service provider (ASP) and Internet service provider services to support its own operations.

Fairmont has acquired commercial software, such as SQL database software from Microsoft Corp., through ASP licenses, said Tim Aubrey, the company's vice president of technology. He said the company plans to act as its own ASP to provide service to its properties in Canada and the U.S., including The Fairmont in San Francisco and The Fairmont Jasper Park Lodge in Jasper, Alberta.

The company has also installed and operates its own high-speed DS-3 (44.7M bit/sec.) North American backbone network (see map at right), which carries data from both management information systems and guest rooms equipped with broadband Internet connections. That makes Fairmont "its own ASP and its own ISP," Aubrey said, calling it a "nontraditional approach" to IT in the lodging industry.

Pearl Brewer, chairwoman of the school of hotel management at the University of Nevada, Las Vegas, said Fairmont's ASP approach puts Fairmont ahead of the rest of the lodging industry, which has been slow to adopt that approach to software because of bandwidth constraints that the company has overcome with its own high-speed network.

### Independent Route

Mark Hamilton, a consultant at Evans & Chastain Consulting LLP in Houston, called the Fairmont approach to IT "extremely unusual," since most hotels tend to outsource their IT support. "I don't know of a hotel company that owns its infrastructure to this extent," Hamilton said.

Aubrey said his IT budget and development plans benefited from the fact that while Fairmont's properties are some of the oldest and most historic in North America, they now belong to a company less than one month old. Many of its historic properties were built and owned by Canadian Pacific Ltd. in Calgary, Alberta, which spun off Fairmont as a separate public company earlier this month.

That provided the hotel company with "a healthy balance sheet" that has included an equally hefty IT budget over the past two years, said Aubrey.

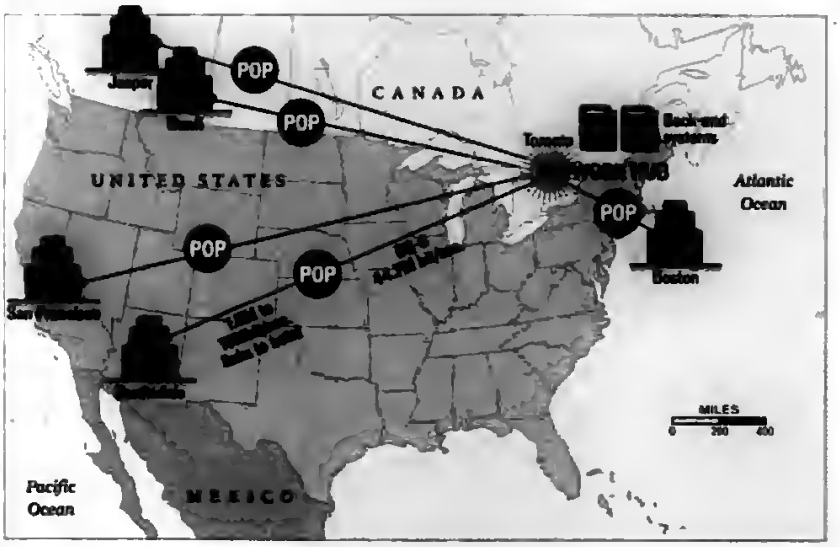
Still, Fairmont's IT spending will decline next year to roughly $10 million as the company finishes installing high-speed broadband access in all 20,000 of its guest rooms, with room wiring costs running up to $500 per room, said Aubrey.

Aubrey said Fairmont management views its in-house IT expertise, which spans from network management to Web development to in-house application development, as a "competitive advantage" when it comes to serving guests and making affiliate agreements with other properties. Fairmont is in the process of developing extra services for guests over its in-room broadband connections, but Aubrey declined to specify what those include.

Over time, Fairmont could parlay its network investments into voice over IP phone service to guests, said Hamilton. If that happens, Hamilton said, Fairmont could turn a high-cost service — guest room phone connections — into a profit center.

## The Fairmont Hotels Network

*A high-speed DS-3 network (44.7M bit/sec.) aggregates traffic to and from point-of-presence (POP) switches, which relay data to and from hotels at speeds of 1.5M bit/sec. or higher, depending on the hotel size and location. The network provides a backbone for hotel management information systems and Internet traffic from high-speed connections in guest rooms, with Fairmont acting as its own Internet service provider.*



# BUY A SERVER WITHOUT THESE FEATURES, AND YOU'LL PAY FOR IT EVERY DAY.

- **PRE-FAILURE WARRANTY** Some manufacturers only offer warranties to cover their products after they break. But our warranty lets you replace components (like processors, memory or hard drives) before they fail, saving you potential downtime.
- **MEMORY FAILOVER PROTECTION** When minor memory errors reach a certain threshold, other servers fail. But ours can automatically copy disk contents and transparently switch over to online spare memory, giving you control over downtime.
- **CONSISTENT SMART ARRAY CONTROLLERS** A new server can mean tedious RAID controller configuration. Our controllers make life easier with consistent upgradability, data transfer and management tools between generations, saving time.

## COMPAQ PROLIANT. THE SERVER THAT SETS THE INDUSTRY STANDARD.

Fact: a server's purchase price is only about 20% of your total ownership cost. So we engineer ProLiant Servers with dozens of features that save time and wipe out management problems. Where other servers are designed to be less expensive to make, ours are actually less expensive to use. And now that we've lowered our prices, it's hard to make a case for using anything else.

**PROLIANT DL360**
**The flexible 1U rack server and *Network Magazine*'s product of the year 2001.**

- 1U rack form factor
- Intel® Pentium® III processor 1.26GHz with 133MHz GTL bus
- Dual processor capable
- 512KB level two ECC cache

**STARTING AT: $2,599**
**Or lease for $0 down and $81 for 48 months**

**PROLIANT ML370**
**High performance, flexibility, and affordability for Web hosting, mail, file/print and small business databases.**

- 5U tower form factor (Rack conversion kit available)
- Intel® Pentium® III processor 1.26GHz with 133MHz GTL bus
- Dual processor capable
- 512KB level two ECC cache

**STARTING AT: $2,899**
**Or lease for $0 down and $90 for 48 months**

**PROLIANT DL380**
***NetworkWorldFusion*: "the most well thought-out server we've seen"**
**Winner, *NetworkWorld* World Class award, Aug. 2001.**

- 2U rack form factor
- Intel® Pentium® III processor 1.26GHz with 133MHz GTL bus
- Dual processor capable
- 512KB level two ECC cache

**STARTING AT: $3,649**
**Or lease for $0 down and $113 for 48 months**

**$0 DOWN FINANCING WITH NO PAYMENTS UNTIL 2002**

intel inside
pentium® III

**CALL 1-800-AT-COMPAQ**
**or visit compaq.com/proliantd**

RFX

Prices shown are Compaq prices, reseller and retailer prices may vary. Prices shown are subject to change and do not include applicable state and local sales tax or shipping to recipient's destination. Financing available through Compaq Financial Services Corporation (CFSC) to qualified commercial customers in the U.S. Financing subject to credit approval and execution of standard CFSC documentation. Monthly lease payments are based on 48-month lease with a fair market end-of-lease-term purchase option and do not include taxes, fees, or shipping charges. Customers may defer lease payments for 4 months from lease start date, to be followed by 44 monthly payments. Other lease terms available. Leases must start between 10/1/01 and 12/31/01 to qualify. Other fees and restrictions may apply. CFSC reserves the right to change or cancel this program at any time without notice. For hard drives GB=billion bytes. 1U=1.75-in. Certain restrictions and exclusions apply. Consult the Compaq Support Center at 1-800-OK-COMPAQ for details. ©2001 Compaq Computer Corporation. All rights reserved. Compaq, the Compaq logo, and ProLiant are registered trademarks of Compaq Computer Corporation. Inspiration Technology is a trademark of Compaq Information Technologies Group, L.P. in the U.S. and other countries. Intel, the Intel Inside logo, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Other products mentioned herein may be trademarks of their respective companies. Compaq is not liable for editorial, pictorial, or typographical errors in this advertisement.

COMPAQ
Inspiration Techno

# Users Lukewarm on Microsoft's J# Plan

*Some companies finding alternatives to new tool aimed at Java developers*

BY LEE COPELAND

MICROSOFT CORP. last week trotted out the newest tool in its development arsenal, aimed at Java development on Windows platforms. But the Visual J# beta release may be too late for some developers, who say they have already resorted to other options, and too limited for others, who don't want to be tied to Microsoft's .Net technology.

Houston-based United Space Alliance (USA), which conducts space operations for NASA, is one company that has already dealt with the problem J# was designed to solve. To build an equipment and parts stowage application for the International Space Station, U.S. and Russian developers chose Santa Clara, Calif.-based WebGain Inc.'s VisualCafe Java tool, but they're running the Web-based application on Microsoft's Windows NT, said Frank Wood, space operations computing team leader at USA.

"We're not a dedicated Java shop, but we couldn't use [Microsoft's] Visual J++ because it's not a standard implementation of Java," said Wood. "We got the impression that Microsoft and Java are mutually exclusive."

Wood said NASA couldn't change its hardware installation, which had passed strict space-requirements testing, and Russian engineers insisted on a standards-based development tool. Using WebGain's tool was the best alternative, he said, even though it's not optimized for Windows NT.

Microsoft claims that J# (pronounced "J sharp") will tackle such problems. The tool, released for beta-testing last week, allows developers to write native .Net applications and services using Java language syntax. But as Tony Goodhew, Visual J# product manager at Microsoft, pointed out, the new tool isn't Java.

"This is not about trying to develop some tool that supports some second-generatioo legacy Sun technology," he said. "This is about giving Java language developers the ability to build great XML Web services on the .Net platform."

Microsoft last January settled a long-standing lawsuit with Sun Microsystems Inc. by paying Sun $20 million and agreeing to several terms. The settlement barred Microsoft from using Sun's Java technology; Microsoft discontinued its Visual J++ tool at that time.

Using Visual J#, developers can create code that compiles into Microsoft Intermediate Language and executes on .Net environments. The beta version supports Windows 2000, but Goodhew said the final version, slated to be available in the middle of oext year, will support all Microsoft operating systems from Windows NT forward. The .Net technology is expected to be available by year's end. But rather than wait, several users are going forward with non-Java third-party development tools for Microsoft operating systems.

F-16 maker Lockheed Martin Corp. built its internal radar-simulation application with Eiffel object-oriented tools from Interactive Software Engineering in Goleta, Calif., said Robert Morimizu, manager of radar modeling simulations at the Bethesda, Md.-based defense contractor. The application runs oo both Windows NT and Sun's Solaris.

"Going to C# or J# or any .Net language is not ideal to us because our environment includes investments in Solaris machines. We didn't want to get stuck down a dead end," Morimizu said. "We didn't choose Java because of speed and performance issues."

Although Visual J# aims to fill the void left by Visual J++, developers said a tool that focuses oo .Net alone won't bring them back.

"Microsoft realizes that Java is out there, and they want to regain some of that development base," said Richard Kandetzki, director of software developmeot at Kaman Corp., a musical instrument distributor and military helicopter maker in Bloomfield, Conn. ◗

## Visual J#

**What is it?** Visual J# is a Javalike tool that will replace Visual J++.

**What's the story behind it?** In its $20 million settlement with Sun, Microsoft was barred from using Java. This is its replacement option.

**When will it be available?** It's in beta and should ship by mid-2002.

**Where will it run?** Only on Microsoft's platforms. Win 2k is supported now, but Microsoft plans to support from Windows NT forward.

# Shell to Set Up $250M Global Data Pipeline

*Consolidation of network services providers expected to yield big savings*

BY JAMES COPE

Moving to overhaul what it acknowledged as an inefficient spider web of a network, Royal Dutch/Shell Group of Companies last week detailed a $250 million project designed to create a hub-and-spoke architecture that will rely oo a reduced number of networking services providers.

Rob van Zwieteren, group infrastructure telecommunications manager at Netherlands-based Shell Informatioo Technology International BV, said the three-year project will tie together Shell operations in 114 countries via a single network infrastructure. Shell expects to save up to $50 millioo during that period by consolidating multiple telecommunications services deals under a master contract with London-based Cable & Wireless PLC, be said.

Shell's existing network and telecommunications infrastructure "is fragmented across business units, and one of the key savings areas is consolidating contracts with fewer suppliers," van Zwieteren said. C&W will manage the consolidation process, he said.

The two companies haven't decided how many services providers will still be needed. But van Zwieteren said an example of what Shell has in mind would be to settle on a single contract for mobile phone services across Europe.

The deal with C&W, which also includes the installation of wide-area network equipment, is the second major IT consolidation move by Shell in recent months. In July, it signed a $100 million agreement with IBM for hardware that will be used to set up three major data center hubs around the world.

The new networking infrastructure will connect 21 Shell data centers, all in different countries, over C&W's backbone network, said Alistair Mashford, a consultant at the oetworking vendor.

Shell will have access to Asynchronous Transfer Mode technology and frame-relay and IP virtual private network services, Mashford said. He added that the new WAN will use routers from Cisco Systems Inc., with Cisco switches controlling network traffic across LANs tied into the global oetwork. C&W also plans to add carrier equipment from Alcatel S.A. and Nortel Networks Corp. to its backbone network as part of the Shell project.

Van Zwieteren said Shell will continue to handle network management operations internally. The network will support systems running enterprise resource planning applications from SAP AG and Denver-based J. D. Edwards & Co., plus Windows 2000-based desktop software used by 300,000 workers.

Shell began screening networking vendors early last year and chose C&W over three other finalists, van Zwieteren said. He wouldn't identify those companies.

Lisa Henderson, an analyst at TeleChoice Inc. in Tulsa, Okla., said users can cut costs and make it easier to manage their networks by reducing the number of network services providers they have under contract. But Shell "is putting a lot of reliance on Cable & Wireless now," she said, adding that a phased migration plan "is certainly in order for a project of this magnitude." ◗

AT A GLANCE

## Shell's New Network Plan

*The Shell/Cable & Wireless pact includes the following:*

**Value:** $250M over the next three years.

**Cost savings expected by Shell:** $50M during the initial contract period.

**Planned infrastructure:** Hub-and-spoke architecture connecting Shell data centers in 21 countries.

**Key technology:** Cisco routers, switches. Alcatel and Nortel carrier equipment.

# RSA ClearTrust®

## Introducing Authorization From The Most Trusted Name in e-Security™

To deliver on the promise of e-business, you need a complete, trusted online environment. This means knowing who you're doing business with and giving them access to the right resources. That's where authorization comes in. Authorization empowers organizations to safely push their business processes out of the back office and onto the Web, where they can be accessed by employees, customers and partners. Unleashing dramatic cost savings, improved customer service, stronger relationships and faster response to a rapidly changing business environment.

When you're ready for an authorization solution, you need a partner you can trust. More than 8,000 organizations already trust RSA Security to deliver e-security solutions. RSA ClearTrust® is our privilege management and user access solution that can meet your authorization needs. To learn more, contact RSA Security, the most trusted name in e-security, at 800-495-1095 or www.rsasecurity.com/go/cleartrust.

RSA SECURED

*Products displaying this symbol contain or are compatible with the world's best e-security technologies and products*

RSA SECURITY™
The Most Trusted Name in e-Security™

www.rsasecurity.com/go/cleartrust

***Free white paper!***
***"Authorization: Unified Privilege Management Solutions for Secure e-Business"***

**Want to reduce the risks and reap the benefits of e-business with a secure Web environment?**
**Register for our free Web security seminar at www.rsasecurity.com/go/webportfolio/**

RSA, ClearTrust, the RSA Secured logo, "The Most Trusted Name in e-Security" and the RSA Security logo are trademarks or registered trademarks of RSA Security Inc. All other trademarks are property of their respective owners. ©2001 RSA Security Inc. All rights reserved.

# BRIEFS

## Plan for Secure GovNet Resurfaces

Richard Clarke, the federal government's new cybersecurity czar, renewed a push to create a secure IP-based network for government use. Called GovNet, the network would be operated separately from the Internet.

The proposed plan, which could cost billions of dollars, was first suggested late last year and is aimed at protecting sensitive government data from hackers.

## IBM Rolls Out New Desktop, Laptop PCs

IBM announced four ThinkPad laptop PCs and three NetVista desktop systems aimed at corporate users. They feature built-in wireless capabilities and security technology that can encrypt user keys, files and e-mail messages. Also included is software that can be used to create a single "super image" of the PC configurations and applications used within a company.

## Network Associates To Drop Two Products

Santa Clara, Calif.-based Network Associates Inc. reported an $11.3 million third-quarter loss and said development of its Gauntlet firewall software and PGP encryption technology is being stopped as part of a plan to sell off these products. The company also said the rest of its PGP Security division will be folded into its McAfee and Sniffer units.

## Short Takes

Bedford, Mass.-based RSA SECURITY INC. said it plans to cut its workforce by 15% following a $15.5 million third-quarter loss on revenue of $62.6 million. . . . Sunnyvale, Calif.-based ADVANCED MICRO DEVICES INC. introduced a new version of its Athlon microprocessor, the Athlon XP, which is designed for use in high-end desktop PCs.

# Aerospace Group Backs New EDI-to-XML Bridge

*Document-exchange spec supports existing data formats and definitions*

BY MICHAEL MEEHAN

AS TECHNICAL standards bodies attempt to harmonize data-sharing specifications in the Balkanized world of XML, an aerospace industry group is adopting a new approach that converts existing electronic data interchange (EDI) data formats and definitions into XML.

Announced last week by Vitria Technology Inc. in Sunnyvale, Calif., the Value Chain Markup Language (VCML) retains the structure, business terms and industry specifications of the xl2 and Electronic Data Interchange for Administration, Commerce and Transport (EDIFACT) standards and translates them into formats that can be understood by XML-based systems.

The Aerospace Industry Association of America Inc. (AIA) in Washington said it plans next month to publish business-to-business collaboration specifications based on VCML for use by its members in exchanging documents such as purchase orders and invoices.

"It means that we don't have to throw out 30 years of development on the EDI side," said Bob Moore, co-chairman of the AIA's Electronic Enterprise Working Group and an e-commerce executive at Goodrich Corp. in Charlotte, N.C.

XML resolved the problem of the value-added network and connectivity charges associated with EDI, but it "didn't solve the problems of back-end integration," Moore added. "In fact, it exacerbated the problem because there's so many XML dialects out there."

Tom Warner, a member of Moore's working group and an e-commerce initiatives manager at The Boeing Co. in Chicago, said standards bodies need to better leverage what users have in place, which is what he likes about VCML.

"The standards guys are building the future, and I'm always looking for the ability to get from where I'm at to where they're going," he said. "I'm not after the perfect XML solution. I want a business solution."

Vitria executive Daryn Walters said the application integration software vendor has developed iterations of VCML for 11 different vertical industries. It also plans to make VCML available to all XML standards bodies, he said.

During the past two weeks, the major standards groups that back xl2, EDIFACT and electronic business XML (ebXML) have been trying to define a common set of core technology components. And VCML last week was accepted by a joint ebXML/EDIFACT committee for use in creating transitional XML standards.

"We all agree a final state is not here now, and we have to do something transitional," said Ralph Berwanger, a member of the joint standards committee and executive at Irving, Texas-based e-commerce network provider bTrade Inc. "We need to give users something in the next months that they can actually use."

The joint committee also accepted submissions from the Open Applications Group Inc., a Marietta, Ga.-based nonprofit consortium, and from ebXML's own core components committee.

Berwanger said VCML has been criticized for "perpetuating some of the problems that we know exist in [EDI]," such as variations between the specifications for different industries.

But firms that use VCML "may find out that it works, and that might be what counts most at the end of the day," he added.

According to Joanne Friedman, an analyst at Stamford, Conn.-based Meta Group Inc., VCML-based systems should be relatively inexpensive and uncomplicated to implement and maintain.

"It's something people can get their heads around," she said. "XML remains esoteric to many [users]."

AT A GLANCE

## What Is VCML?

*The Value Chain Markup Language (VCML) proposal being endorsed by companies in the aerospace industry:*

- Uses XML data formats to transmit documents created using EDI structures and terminology.
- Supports EDI specifications for 10 other industries, including automotive and health care.
- Was designed to work with any-to-any mapping products, autotranslation tools and custom e-commerce applications.
- Includes data vocabularies that share a common XML syntax and document structure.

## VCML Joins Crowded XML Standards Field

VCML may offer a potential migration path to XML for EDI users, but the new specification is just one entry in a crowded standards field.

Numerous companies have already invested significant time, effort and money in attempts to create common XML semantics for corporate users. For example, Commerce One Inc., SAP AG and Sun Microsystems Inc. are working to modify a specification developed by Pleasanton, Calif.-based Commerce One so it can function as a universal XML business library.

SAP and Sun signed on with Commerce One earlier this year. However, analysts said a possible drawback for Commerce One's XML Common Business Library is that it was built in the early days of business-to-business applications and focuses on simple purchase orders, leaving it wanting for dealing with complex orders between supply chain partners.

The Open Applications Group Inc. consortium submitted its Business Object Documents (BOD) specification to the joint EDIFACT/ebXML committee that's trying to develop transitional XML standards. The BOD approach, which, like VCML, was accepted for possible use, is another method of converting business documents to different data formats.

Companies can use BODs to create virtual object wrappers around their systems so purchase orders and other documents can be reimplemented in different formats. But the downside of BODs is that they don't allow for one-time conversions and require too much maintenance, analysts said.

Also vying for attention is RosettaNet, a Santa Ana, Calif.-based consortium of technology vendors that has developed an XML-based e-business language for high-tech companies. But the RosettaNet specification was built for companies with more technical savvy than most users have, and analysts remain skeptical that what works in the high-tech industry can be translated to other markets.

– *Michael Meehan*

CUSTOMER SATISFACTION

cisco.com/go/certifiedpartner

Implementing new technologies end getting it done right tha first time is now more critical than ever. To thia end, customer setisfaction is a major focus of the Cisco Certified Partner Program. Each Gold, Silver and Premier Certified Partner has eccess to the same tools Cisco uses to track customer satisfaction and pinpoint areas of improvement. This obsession with satisfying customers goes beyond reselling hardware. Cisco Certified Partners also provida consulting, professional services, systema integration, resale and support. So you can maximize the return on your network investment. To learn more or to locate the partner right for you, visit cisco.com/go/certifiedpartner

Cisco Systems

Empowering the Internet Generation™

©2001 Cisco Systems, Inc. All rights reserved. Discover All That's Possible on the Internet and Empowering the Internet Generation are service marks, and Cisco, Cisco Systems and the Cisco Systems logo are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and certain other countries. The use of the word "partner" does not imply a partnership relationship between Cisco and any other company

*Continued from page 1*

## HP/Compaq

for the best item, and you don't want to buy your linens from the grocery store."

Although she lauded Compaq's support, Lorch said Phoenix-based Kitchell still switched from Digital Equipment Corp. Alpha servers to new machines from Dell Computer Corp. for performance reasons and to support its new enterprise resource planning system from Denver-based J.D. Edwards & Co.

At Gartner Inc.'s Symposium/ITxpo here, HP's Carly Fiorina and Compaq's Michael Capellas described the merger as a triple win for users, claiming that customers will get a stronger hardware lineup, a beefed-up services organization and a cash-fat company that will spawn innovation.

Capellas said he hopes to convince IT shops of the advantages of working with an $87 billion computing giant with a slew of services and hardware options.

"Our large customers view this as a positive thing," Capellas told *Computerworld* last week. "[They] see this as the ability to have one strategic partner doing more things."

Yet many users said they fear the merger will accomplish the opposite, forcing the vendor to trim its smorgasbord of overlapping products.

"It looks like HP is carrying the big stick," said Roger Riediger, engineering systems supervision at Kaiser Aluminum Inc., a $2 billion maker of aluminum plating for aircraft and armed vehicles. "It's a match up and down the product lines, so what hardware they will support is my concern."

The Houston-based company uses Digital Alpha and Compaq ProLiant servers as part of its back end but fears that those lines might not exist under the merged HP/Compaq.

**Quick Link** A Q&A with Carly Fiorina and Michael Capellas is on our Web site.
www.computerworld.com/q?a1110

"As the months wear on, assuming this merger goes through, the anxiety will continue to build," said John Moon, CIO at Deerfield, Ill.-based Baxter International Inc. The $7 billion medical services provider purchases its laptop, desktop and server hardware exclusively from Compaq.

"There is not a lot that they can come forward and talk about," Moon said, acknowledging that the vendors are hamstrung by government regulations about revealing merger details. "But I don't think there is a master plan at this point."

However, Fiorina and Capellas have said both companies are committed to a multiple operating-system approach.

"What we're not permitted to say is precisely how we're going to do that," Fiorina said. "But I think the first really important point is that multiple OSes are here to stay because they play different roles. Period."

Fiorina's and Capellas's outreach appealed to some users. "My view of this deal is improved, mainly by seeing Carly Fiorina," said Robert O. Graham, chief technical officer at Leonia, N.J., outsourcing company Infocrossing Inc. "She's obviously a leader, and she really understands the factors involved in the business process."

Clifford E. DuBord agreed and said seeing both CEOs convinced him that "the deal makes good business sense."

But DuBord, IT manager at a nuclear power facility in Lycoming, N.Y., that's run by Niagara Mohawk Power Corp., is still worried about support.

Two years ago, after Compaq's buyout of Digital, his direct involvement was necessary to gain attention from Compaq service representatives, he explained.

"That's something I'm not interested in having happen again," DuBord said.

Those kinds of stories make users uncomfortable about the long-term effects of the deal.

"When you talk to HP, it's difficult to get a message through the organization as a whole, because they operate as divisions with suborganizations with their own profit center," said Ophir Trigalo, CIO at Chicago-based DePaul University. "When Compaq comes in, will it be just another cell within the organization?"

*Reporter Mott Hamblen contributed to this report.*

### After the Merger

*According to HP and Compaq, the combined company would have annual revenue of $87 billion from four business units:*

# Office Depot Hedges Its Handheld Bets

## *Strikes Pocket PC deal with Microsoft but hasn't abandoned Palm partnership*

BY BOB BREWIN

When Microsoft Corp. held the formal launch of the Pocket PC 2002 earlier this month, the vendor had, by all appearances, scored a coup by landing a key Palm Inc. enterprise customer: Office Depot Inc., which began rolling out a Palm OS-based wireless system to its delivery fleet a year ago.

Bruce Nelson, CEO of Delray Beach, Fla.-based Office Depot, appeared on stage with Microsoft CEO Steve Ballmer to extol a Pocket PC enterprise system developed jointly by the two companies, and it looked like Palm's run at Office Depot had ended.

Christine Boyd, a spokeswoman for Santa Clara, Calif.-based Palm, said she later read the story about Office Depot and the Pocket PC with disbelief, since she knew that Office Depot had cast its lot with Palm. What she didn't know was that Office Depot had hedged its bets by also partnering with Microsoft.

Even so, that partnership is a fledgling one. Despite the company's highly visible endorsement of the Pocket PC, Office Depot spokeswoman Lauren Garvey said the store management system demonstrated by Nelson and Ballmer is only in the trial phase.

"We are still testing, and I don't know what the expectations are, and I don't know how long that will take," Garvey said. But Office Depot "has every intention" of rolling out the Pocket PC-based system, she added.

Garvey said the company has completed its nationwide rollout of wireless devices based on the Palm OS from Holtsville, N.Y.-based Symbol Technologies Inc. to the drivers of its 2,000 trucks. The system lets drivers scan shipments and create an electronic manifest as deliveries are loaded on a truck. It can then capture customer signatures electronically.

Office Depot is working on enhancements to that delivery system, including allowing customers to track the status of their orders via its Web site, said Garvey.

Users and analysts agreed that with its second release of the Pocket PC software, Microsoft has mounted a formidable challenge to Palm. It has 22 original equipment manufacturers and a host of software partners targeted at the enterprise.

But while they said they see a decline in Palm's share of the handheld market, analysts predicted that the company will remain a competitor and that the two platforms will provide users with a choice that isn't available in the desktop market. That choice will be governed by applications, navigation environment and personal preferences, with some companies running a mix of Palm and Pocket PC systems, as Office Depot could end up doing.

But most companies will likely opt for one or the other.

Informed Beverage Management Inc., which develops applications for the bottling industry, prefers Palm-based hardware. The Palm OS "is easier to write applications for [and] has a longer battery life," said Rick Browning, a regional sales manager at the Charlotte, N.C.-based firm.

Battery life is key for truck-route applications, and Palm-powered handhelds far outlast Pocket PCs, he added. "The battery in a Palm can go for days, while the battery in a Pocket PC runs about six hours," Browning said.

Tony Burdick, IT manager at William Blair & Co., a financial services firm in Chicago, said he "never had an interest in Palm," due to its lack of support for cellular wireless data systems. He is currently beta-testing cellular data-equipped Pocket PCs from Compaq Computer Corp. and said he has found them to be "powerful" enterprise tools.

*Continued from page 1*

## HP/Compaq

for the best item, and you don't want to buy your linens from the grocery store."

Although she lauded Compaq's support, Lorch said Phoenix-based Kitchell still switched from Digital Equipment Corp. Alpha servers to new machines from Dell Computer Corp. for performance reasons and to support its new enterprise resource planning system from Denver-based J.D. Edwards & Co.

At Gartner Inc.'s Symposium/ITxpo here, HP's Carly Fiorina and Compaq's Michael Capellas described the merger as a triple win for users, claiming that customers will get a stronger hardware lineup, a beefed-up services organization and a cash-fat company that will spawn innovation.

Capellas said he hopes to convince IT shops of the advantages of working with an $87 billion computing giant with a slew of services and hardware options.

"Our large customers view this as a positive thing," Capellas told *Computerworld* last week. "[They] see this as the ability to have one strategic partner doing more things."

Yet many users said they fear the merger will accomplish the opposite, forcing the vendor to trim its smorgasbord of overlapping products.

"It looks like HP is carrying the big stick," said Roger Riediger, engineering systems supervision at Kaiser Aluminum Inc., a $2 billion maker of aluminum plating for aircraft and armed vehicles. "It's a match up and down the product lines, so what hardware they will support is my concern."

The Houston-based company uses Digital Alpha and Compaq ProLiant servers as part of its back end but fears that those lines might not exist under the merged HP/Compaq.

**Quick Link** A Q&A with Carly Fiorina and Michael Capellas is on our Web site.
www.computerworld.com/(?ofHP)

"As the months wear on, assuming this merger goes through, the anxiety will continue to build," said John Moon, CIO at Deerfield, Ill.-based Baxter International Inc. The $7 billion medical services provider purchases its laptop, desktop and server hardware exclusively from Compaq.

"There is not a lot that they can come forward and talk about," Moon said, acknowledging that the vendors are hamstrung by government regulations about revealing merger details. "But I don't think there is a master plan at this point."

However, Fiorina and Capellas have said both companies are committed to a multiple operating-system approach.

"What we're not permitted to say is precisely how we're going to do that," Fiorina said. "But I think the first really important point is that multiple OSes are here to stay because they play different roles. Period."

Fiorina's and Capellas's outreach appealed to some users. "My view of this deal is improved, mainly by seeing Carly Fiorina," said Robert O. Graham, chief technical officer at Leonia, N.J., outsourcing company Infocrossing Inc. "She's obviously a leader, and she really understands the factors involved in the business process."

Clifford E. DuBord agreed and said seeing both CEOs convinced him that "the deal makes good business sense."

But DuBord, IT manager at a nuclear power facility in Lycoming, N.Y., that's run by Niagara Mohawk Power Corp., is still worried about support.

Two years ago, after Compaq's buyout of Digital, his direct involvement was necessary to gain attention from Compaq service representatives, he explained.

"That's something I'm not interested in having happen again," DuBord said.

Those kinds of stories make users uncomfortable about the long-term effects of the deal.

"When you talk to HP, it's difficult to get a message through the organization as a whole, because they operate as divisions with suborganizations with their own profit center," said Ophir Trigalo, CIO at Chicago-based DePaul University. "When Compaq comes in, will it be just another cell withio the organization?"

*Reporter Matt Hamblen contributed to this report.*

### After the Merger

*According to HP and Compaq, the combined company would have annual revenue of $87 billion from four business units:*

- Imaging and printing
- Access devices
- Servers, storage and software
- Professional IT services

# Office Depot Hedges Its Handheld Bets

## *Strikes Pocket PC deal with Microsoft but hasn't abandoned Palm partnership*

BY BOB BREWIN

When Microsoft Corp. held the formal launch of the Pocket PC 2002 earlier this month, the vendor had, by all appearances, scored a coup by landing a key Palm Inc. enterprise customer: Office Depot Inc., which began rolling out a Palm OS-based wireless system to its delivery fleet a year ago.

Bruce Nelson, CEO of Delray Beach, Fla.-based Office Depot, appeared on stage with Microsoft CEO Steve Ballmer to extol a Pocket PC enterprise system developed jointly by the two companies, and it looked like Palm's run at Office Depot had ended.

Christine Boyd, a spokeswoman for Santa Clara, Calif.-based Palm, said she later read the story about Office Depot and the Pocket PC with disbelief, since she knew that Office Depot had cast its lot with Palm. What she didn't know was that Office Depot had hedged its bets by also partnering with Microsoft.

Even so, that partnership is a fledgling one. Despite the company's highly visible endorsement of the Pocket PC, Office Depot spokeswoman Lauren Garvey said the store management system demonstrated by Nelson and Ballmer is only in the trial phase.

"We are still testing, and I don't know what the expectations are, and I don't know how long that will take," Garvey said. But Office Depot "has every intention" of rolling out the Pocket PC-based system, she added.

Garvey said the company has completed its nationwide rollout of wireless devices based on the Palm OS from Holtsville, N.Y.-based Symbol Technologies Inc. to the drivers of its 2,000 trucks. The system lets drivers scan shipments and create an electronic manifest as deliveries are loaded on a truck. It can then capture customer signatures electronically.

Office Depot is working on enhancements to that delivery system, including allowing customers to track the status of their orders via its Web site, said Garvey.

Users and analysts agreed that with its second release of the Pocket PC software, Microsoft has mounted a formidable challenge to Palm. It has 22 original equipment manufacturers and a host of software partners targeted at the enterprise.

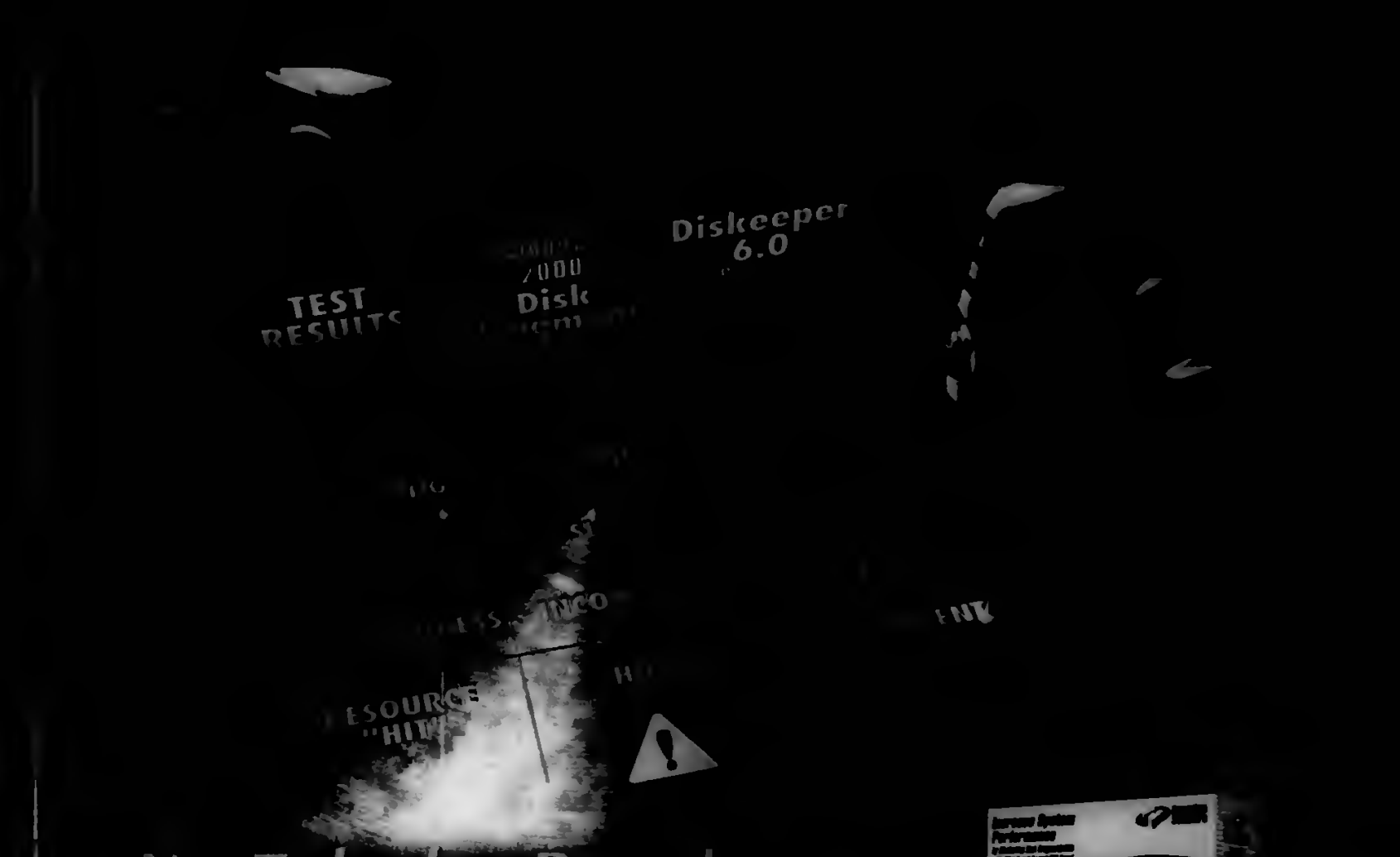
But while they said they see a decline in Palm's share of the handheld market, analysts predicted that the company will remain a competitor and that the two platforms will provide users with a choice that isn't available in the desktop market. That choice will be governed by applications, navigation environment and personal preferences, with some companies running a mix of Palm and Pocket PC systems, as Office Depot could end up doing.

But most companies will likely opt for one or the other.

Informed Beverage Management Inc., which develops applications for the bottling industry, prefers Palm-based hardware. The Palm OS "is easier to write applications for [and] has a longer battery life," said Rick Browning, a regional sales manager at the Charlotte, N.C.-based firm.

Battery life is key for truck-route applications, and Palm-powered handhelds far outlast Pocket PCs, he added. "The battery in a Palm can go for days, while the battery in a Pocket PC runs about six hours," Browning said.

Tony Burdick, IT manager at William Blair & Co., a financial services firm in Chicago, said he "never had an interest in Palm'," due to its lack of support for cellular wireless data systems. He is currently beta-testing cellular data-equipped Pocket PCs from Compaq Computer Corp. and said he has found them to be "powerful" enterprise tools.




# New Technology Beyond "built-in" Limits

## Today's system performance demands require a fast, automated solution.

A slow, resource-hungry, manual defragmenter just can't cut it. Only Diskeeper® 6.0 SE automatic disk defragmenter has been proven to increase system performance up to 200% on Windows® NT®/2000. It's the fastest, most advanced and most thorough performance tool ever built. Period.

**What does Microsoft® say?**
"The version included with Windows 2000 provides limited functionality in maintaining disk performance...." "If you need to automate the disk defragmentation process, obtain a third-party disk defragmenter tool."
*— Microsoft Knowledgebase articles Q227463/Q223146*

**Can you really afford to use a manual defragmenter?**
"The decision to defragment the enterprise automatically versus manually will save companies thousands if not millions of dollars." *— IDC 2000*

Executive Software
Focused Development of System Management Tools

Visit our web site at
www.execsoft.com
1-800-829-6468

*The Bottom Line*

**"These tests clearly show... Diskeeper is a better product for defragmentation."**
***—Lloyd Holder, CEO of NSTL***

For less than the cost of a minor memory upgrade, Diskeeper could be increasing the speed of your system now—*automatically!*

**Download it immediately at:**
***www.CW1.diskeeper.com***

30-day Trialware and more info also available here

© 2001 Executive Software International, Inc. All Rights Reserved. DISKEEPER, EXECUTIVE SOFTWARE and the EXECUTIVE SOFTWARE logo are trademarks and registered trademarks owned by Executive Software International, Inc. Windows, Windows NT and the Certified for Windows 2000 logo are registered trademarks owned by Microsoft Corporation. All other trademarks and brand names are the property of their respective owners.

# SIX DANGEROUS MYTHS

ABOUT e-BUSINESS PLATFORMS.

SYBASE e-BUSINESS SOFTWARE. BECAUSE EVERYTHING

THE STRAIGHT GOODS ON e-BUSINESS PLATFORMS.

### THE WHOLE e-BUSINESS THING IS A FAD.

Nothing could be further from the truth. In times of economic downturn, it may seem prudent to put the whole e-Business issue on the backburner. But it's not. Tough times call for speed, nimbleness and agility more than ever. The time to get smart and implement e-Business solutions for your customers is today.

### THE INTERNET CHANGES EVERYTHING.

The Internet does not change everything. It doesn't change the business rules that run your company. Or the infrastructure you've spent years building. Or the nature of your business. Or your need to generate revenues and profit.

The Internet is obviously a critical part of any e-Business. But the Internet is only a common set of protocols for the transport of information. It's how well you manage that information that determines the success of your business.

### IT'S A ONE-BRAND WORLD.

This myth surrounds just about every significant e-Business platform discussion. Virtually every purveyor of e-Business platforms touts their version of this "one-brand" world. Their brand, of course. Big surprise.

At Sybase, we know it's just not true. Countless brands compete, cooperate and commingle inside your company. It's laughable to pretend that any one external organization can "standardize" all the various protocols, systems, components, new technologies, languages, databases and vendor relationships that your business depends on to succeed.

Our open e-Business platform embraces diversity. Making all of this stuff work together is what our stuff is all about.

### A WEBSITE IS A PORTAL. A PORTAL IS AN e-BUSINESS.

Well, not quite. A website is not a portal. And even if it was, a portal is not an e-Business.

Portals and websites along with application servers, databases, customer relationship programs, automated supply chains, an efficiently connected field force and the rest of your back office are all vital components of an e-Business. It's making them work together that's the trick.

Unless your data has the ability to travel from a customer's pager to your trusty OS/390 mainframe and then back to your customer via cell phone, you may very well have a website, but you really don't have an e-Business.

Our proven e-Business platform totally delivers this end-to-end functionality. It integrates every single aspect of your business. What's more, it has the scalability to constantly integrate your new components into the mix. Like say, 10,000 brand new customers, for example. Or a new CRM app.

Just something to think about when people offer you buzzwords instead of technologies.

### IF AT FIRST YOU DON'T SUCCEED, THROW SOME MORE MONEY AT IT.

Hah. Very funny. But still a popular belief for a long time. Listen: It's all pure poppycock. The real e-Business solutions deliver real-life business results. By that we mean increased revenues, reduced costs and profit to your bottom line.

At Sybase, we provide e-Business solutions among the FORTUNE 500,® to the largest firms on Wall Street, to the biggest names in healthcare, to the world's largest computer and networking companies, and to the biggest players in Europe and Asia.

We lead the way in enterprise portal technology. We strongly dominate in enterprise wireless solutions. And we have some of the best middleware integration solutions found on our planet.

So don't throw your money around. Look for an ROI that has a sense of immediacy. Invest carefully based upon proven past performance and reasonable expectations of return.

### IT'S ALL OR NOTHING.

The Big Bang Theory: You need to do all of this at once. Not at all true.

We can help you solve the problems you have today while simultaneously building a platform that can solve tomorrow's problems, tomorrow.

Implement in the way that's right for your firm. From the bottom up. Or the top down. Component by component. It's your choice.

Call 1-800-8-SYBASE or visit www.sybase.com/myths and we'll show you how. Fact, not myth.

SYBASE®
Information Anywhere™

©2001 Sybase, Inc. All rights reserved. All trademarks are the property of their respective owners.

WORKS BETTER WHEN EVERYTHING WORKS TOGETHER™

# Co-CIO Approach Debated After Change at Capital One

*Credit card company drops shared job, appoints Nasdaq CIO new head of IT*

BY LUCAS MEARIAN

ANALYSTS LAST week noted that the fledgling co-CIO approach to IT management adopted during the past two years by several companies can be difficult to maintain on a long-term basis.

The success of co-CIO arrangements was thrown into question this month when Capital One Financial Corp. announced that it was hiring Gregor Bailar away from his job as CIO at Nasdaq Stock Market Inc. Bailar will take on sole responsibility for Capital One's IT operations, which have been jointly run since early last year by two executives — one from the IT department and the other from the firm's business side.

A Capital One spokeswoman said the Falls Church, Va.-based credit card company never intended to have its CIO job shared on a permanent basis. Co-CIOs Laura Olle and Marjorie Connelly "stepped up and filled in the position," she said. "We've always been in a search for a [new] CIO."

But Capital One's decision to name co-CIOs in February last year was seen as a groundbreaking move, and the shared job had been touted by Olle and Connelly in interviews and speeches as a sign of the cooperation between the company's IT and business units.

Olle, who previously served as senior vice president of IT systems development, and Connelly, who was executive vice president for domestic card operations, couldn't be reached for comment last week.

Capital One said the two will remain at the company after Bailar starts next month, with Olle working for him in IT and Connelly focusing exclusively on business duties.

Bill Bradway, an analyst at Meridien Research Inc. in Newton, Mass., said all indications are that Olle and Connelly worked well together. But the co-CIO approach has some big flaws, he added.

"You may have two sprinters, but then you put a potato sack around their feet and you slow them down," Bradway said. "You end up with divided loyalties, and too much organizational energy gets expended around politicking."

"I think the issue is agreeing on what to do [as co-CIOs]," said Larry Tabb, an analyst at Needham, Mass.-based TowerGroup. "It becomes very easy, unless you're joined at the hip, to play one against the other."

Other companies that have named co-CIOs include The Goldman Sachs Group Inc. and Ameritrade Holding Corp. New York-based Goldman Sachs gave CIO Leslie Tortora and e-commerce manager Steven Mnuchin shared IT responsibilities in February. Omaha-based Ameritrade appointed two IT executives as co-CIOs in June after Jim Ditmore resigned as head of technology operations.

Goldman Sachs declined a request for comment from its co-CIOs last week, but Ameritrade said the dual position it set up is permanent and operating successfully. In an e-mail interview, Ray Dury, one of Ameritrade's co-CIOs, said the shared job requires trust, a strong commitment to working as a team and clearly defined corporate goals. "And it must be the right two people," he added.

But IT departments need to be rated against a single set of objectives, "and that's more difficult to do with two people sharing the top post," Tabb said. "The buck has to stop at someone's desk."

RÉSUMÉ

## Gregor Bailar

**Starting next month:** Will become CIO at Capital One, focusing on the company's technology strategy and information architecture, as well as business technology planning and the development of IT financial strategies.

**1998 to present:** CIO and executive vice president for operations and technology at Nasdaq, with responsibility for all aspects of IT-related activities.

**1994 to 1998:** Worked at Citicorp as managing director and vice president of advanced development for global corporate banking, overseeing the construction of 39 data centers.

**Prior to 1994:** Held various positions at companies such as Perot Systems Corp., Next Computer Inc. and Hewlett-Packard Co.

# Users Slow to Put Sourcing Apps In-house

*Hosted B2B systems preferred by many*

BY MICHAEL MAHAN

E-commerce software vendors are making their materials-sourcing applications available to users for behind-the-firewall implementations. But some companies said they don't plan to give up on hosted setups, citing flexibility, security and ease-of-maintenance benefits provided by that approach.

In addition, users running hosted sourcing applications said the software likely won't provide their companies with enough of a competitive advantage to justify an investment in internal IT systems.

For example, Leigh Ann Vernon, director of e-commerce at Burlington Northern Santa Fe Corp. (BNSF) in Fort Worth, Texas, said she's in no hurry to switch from a hosted online sourcing system run by Suwanee, Ga.-based Clarus Corp.

Last year, BNSF installed Clarus' online procurement software, which is used widely within BNSF's railway operations to buy office supplies and other goods. But the production materials sourcing software that BNSF went live with in May has a much smaller base of users, Vernon said.

"If we brought [that] in-house, we'd be looking at [adding] a server, a backup server for redundancy, a test server for when we get new applications and a full-time database administrator," Vernon said. "And it's not really stuff that we need to distribute to the bulk of our workforce."

Sunnyvale, Calif.-based Ariba Inc. last month released new sourcing software that users can install internally, after offering earlier versions in hosted setups only. That followed a similar move by Pittsburgh-based FreeMarkets Inc.

Some companies are bringing other types of e-commerce applications in-house. In July, for example, German automaker Volkswagen AG said it was moving a hosted online auction application behind its corporate firewall in order to gain tighter control over sensitive data [Page One, July 23].

Even with materials sourcing, there are companies "that will — hell or high water — want this stuff behind the firewall, to feel like they're in control," said Tim Minihan, an analyst at Aberdeen Group Inc. in Boston. But for now, he added, hosting will likely remain the most prevalent approach for corporate e-commerce users.

Lisa Gibbs, vice president of corporate procurement at ABN AMRO North America Inc., said the Chicago-based bank plans to stick with a hosted sourcing system run by San Francisco-based Cascade Works Inc. unless it discovers a compelling reason to bring it in-house.

Gibbs added that internal implementations can be a drain on IT resources.

"To find good IT staff is difficult," she said. "To find IT people who can readily pick up a new skill set is even more difficult. When nobody in-house has expertise, I definitely want [the software] hosted."

## Two Sides To the Story

*Hosted and in-house e-commerce applications both have potential benefits:*

### Security

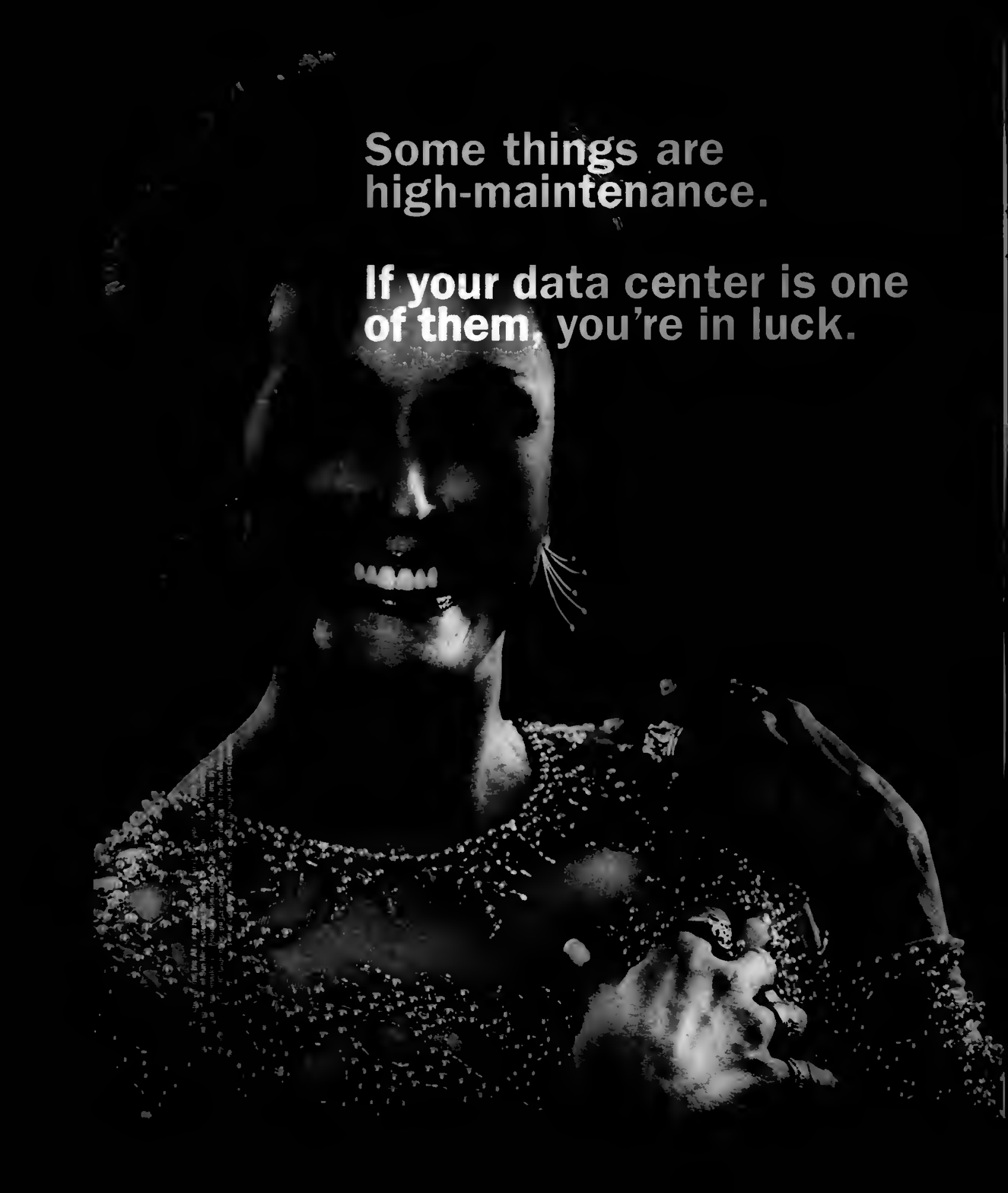
- **Hosted:** Intruders can't directly target firewalls and systems.
- **In-house:** Less data needs to be sent over public networks.

### Reliability

- **Hosted:** Hosts are responsible for fixing problems and glitches.
- **In-house:** Users don't have to worry about their hosting firm going out of business.

### Data Integration

- **Hosted:** Data links can be developed without taxing internal staff.
- **In-house:** Tight integration with back-office systems could increase processing efficiency.


Some things are high-maintenance.
If your data center is one of them, you're in luck.

# Introducing the Sun Fire™ 15K, the mainframe-class server for today's networked data center.

## Go beyond the mainframe. Way beyond.

Mainframes have been the standard in the glasshouse since the '70s. But with their complexity, closed technology and high maintenance costs, mainframes are simply not designed for the modern networked data center. The Sun Fire™ 15K server, on the other hand, has the power to run the most demanding applications – at a fraction of the cost of a UNIX® system or mainframe.

## Ah, the joy of consolidation.

In fact, the Sun Fire 15K server is so powerful, you can consolidate multiple servers and rehost mainframe applications, as well as deploy new mission-critical applications in an open environment. And unlike a mainframe, the Sun Fire 15K server easily integrates into your existing architecture. The Sun Fire 15K server has complete end-to-end system compatibility with the Solaris™/SPARC™ architecture, so you use the same tools, applications, administration and resources to deploy and manage it. No recoding, no retraining and no expensive consultants to come in and "manage" it for you.

## A revolutionary concept in data centers: reduced costs.

The result of all this? A significantly lower total cost of ownership. In the end, by incorporating the new Sun Fire 15K server into your existing architecture, you can reduce your data center's complexity, take control and cut your costs. So take the first step toward liberating your data center–and your bottom line. **www.sun.com**

### Product specifications (the rocket science):

- 106 CPUs – the largest in a single cabinet
- 1/2 terabyte memory – enough to run a database in main memory
- 18 domains – for the utmost in balanced workloads
- 4 petabytes of storage – 20x the Library of Congress
- 6,400 mainframe MIPS – 3x the IBM z900
- 5th-generation fault-isolated dynamic system domains
- Sun™ Fireplane interconnect – maximum app performance
- Uniboard design – swappable CPU and memory board

### Independent software vendor support:

Sun offers software developers an unparalleled open and compatible architecture in which to develop and deploy their solutions. This single integrated system architecture allows customers to protect their investments, leverage their existing skill sets and staff, and increase their ROI. It's the reason ISVs like BEA Systems, i2, J.D. Edwards, Oracle and VERITAS partner with Sun.

take it to the n™

Sun microsystems

# Feds Propose Delay in Spectrum Auction

BY BOB BREWIN

The U.S. government is seeking to delay for three years any plans to take spectrum that's now being used by the Department of Defense and auction it off to telecommunications vendors that are looking to offer high-speed mobile data services.

Analysts said the decision to propose a delay reflects the political difficulty of trying to wrest spectrum from the Pentagon after the Sept. 11 terrorist attacks on the U.S. But they also pointed to the economic slowdown, which has diminished the cash-strapped cellular industry's interest in multibillion-dollar spectrum auctions.

The plan would permanently remove from consideration for commercial use the 1,770-to-1,850-MHz frequency band used by DOD satellite systems. But it would leave the Pentagon's 1,710-to-1,770-MHz band up for grabs and add the 2,110-to-2,170-MHz band as possible spectrum for third-generation (3G) wireless services.

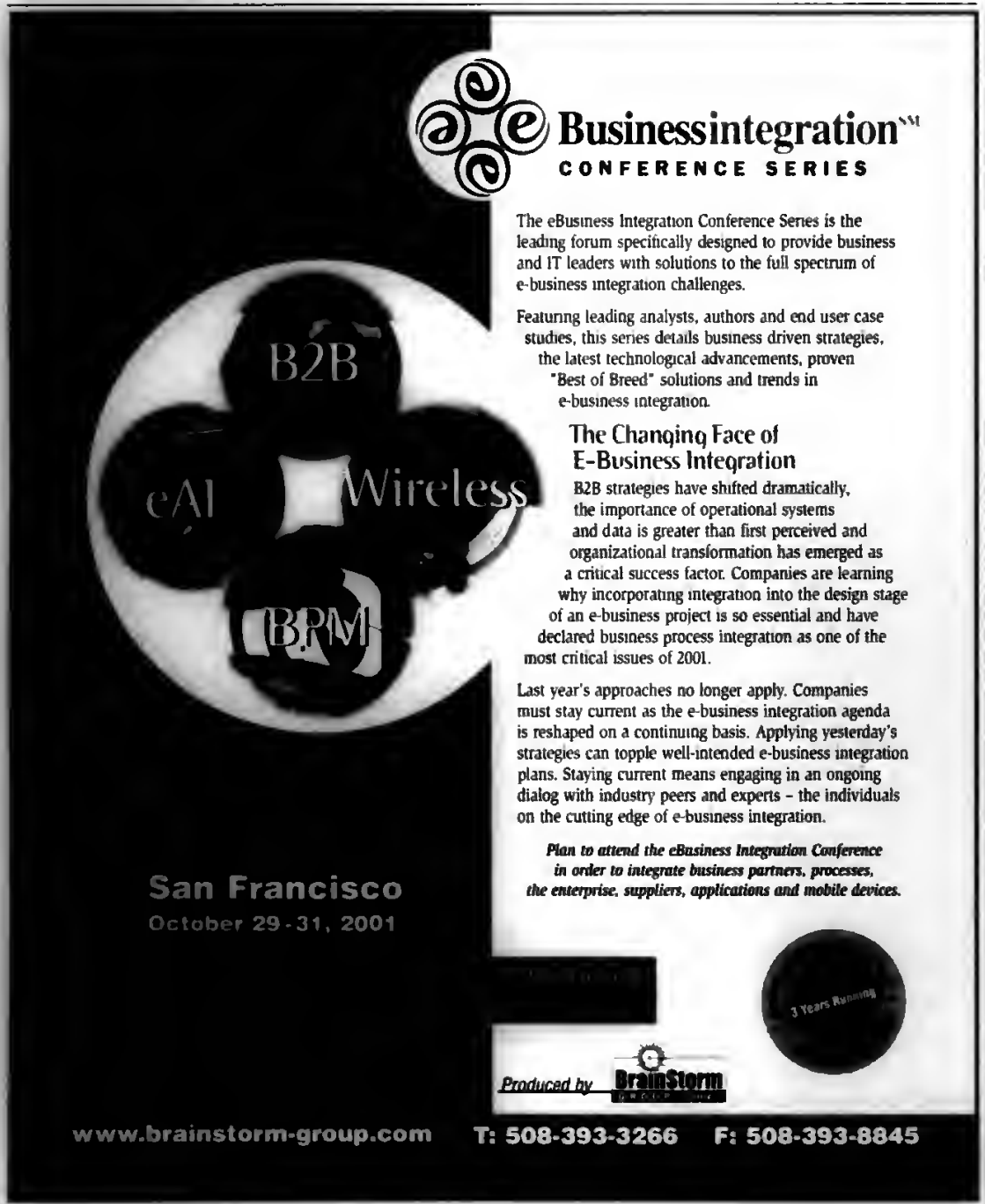
The National Telecommunications and Information Administration (NTIA), an arm of the U.S. Department of Commerce, said the new plan was jointly approved by Commerce Secretary Donald Evans and Michael Powell, chairman of the Federal Communications Commission.

The NTIA added that the use of other spectrum bands for 3G data services will also be studied. The assessments are due by next spring, but legislation has been proposed that would extend the deadline for auctioning 3G spectrum from next September to 2004.

Jim Lewis, a technology policy analyst at The Center for Strategic & International Studies in Washington, said the cellular industry had advanced its case for switching DOD-controlled spectrum to commercial 3G uses. But that was before the terrorist attacks.

"No one has figured out a way to gracefully move [the DOD] from its spectrum, and now is not the time to even start thinking about it," Lewis said, referring to last week's air strikes in Afghanistan by U.S. and British forces. But, he added, the DOD "could probably do a better job" of using the spectrum it occupies.

Emory Winship, who helped launch wireless data services at San Francisco-based Charles Schwab & Co. five years ago and is now a consultant at Conversus Group LLC in New York, said many U.S. wireless carriers don't have money to spend on spectrum auctions because of the economic downturn. The planned delay is a smart financial move on the government's part because spectrum currently "has a discounted value," he said.



**IS YOUR WEB CONTENT OUT OF CONTROL?** It's growing larger and it's headed your way. Business content generated enterprise-wide in multiple formats that needs to rapidly, safely become Web accessible. The job of managing and publishing it all on the Web is a daily disaster. Enter Stellent. The software choice of the titans of business — Merrill Lynch, Carrier Corporation, IKON Office Solutions and 1,500 others. Take back control. Automatically manage content for your business Web sites and enterprise applications without changing the way you create it. Visit www.instant.stellent.com/twister for an eye-opening 3-minute demo.

**STELLENT™**

BUSINESS CONTENT MANAGEMENT

FORMERLY INTRANET SOLUTIONS.

© 2001 Stellent, Inc. Stellent and the Stellent logo are trademarks of Stellent, Inc.

© 2001 Microsoft Corporation. All rights reserved. Microsoft, the Office logo, the Windows Start logo, the Internet Explorer logo, and the Outlook logo are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. Canary yellow color is a trademark of 3M.

# Did you receive more than 25 e-mails today?

# If so, then you're a project manager.

The workplace is more demanding than ever. And to make it even more challenging, you're responsible for managing a multitude of complex tasks. So, whether you consider yourself to be one or not, you're a project manager. You're expected to create products or services rapidly and on a budget, no matter how quickly the business environment changes around you. That's why Microsoft® Project 2000 is filled with flexible tools for scheduling, organizing, analyzing, and reviewing all kinds of tasks and projects. It's also optimized with features that automatically update information, manage resources, and let users work collaboratively across an organization. So, now you're a project manager. Congratulations. To find out more, visit **microsoft.com/project** or go to Internet Keyword: Microsoft Project. **Software for the Agile Business.**

Microsoft

# BRIEFS

## Microsoft Signs On As Groove Investor

**Microsoft Corp. agreed to invest about $51 million in Groove Networks Inc., a Beverly, Mass.-based vendor of peer-to-peer collaboration software that was founded by former lead Lotus Notes developer Ray Ozzie. Microsoft will get an unspecified minority equity stake for its investment, which accounted for most of a $54 million cash infusion that Groove announced.**

## Commerce One to Fall Short on Q3 Results

**Business-to-business software vendor Commerce One Inc. warned that its third-quarter financial results will be lower than anticipated, saddling the Pleasanton, Calif.-based company with its third straight weak quarter. Commerce One said it now expects to report an operating loss of up to $49 million on revenue of about $83 million. That's down from $112.7 million in revenue in last year's third quarter.**

## Transmeta Delays Crusoe Upgrade

**Santa Clara, Calif.-based chip maker Transmeta Corp. said the third-quarter revenue it will report could be as much as 50% below earlier projections. The company also postponed the planned shipment of a new version of its Crusoe processor for laptop PCs until later this year because of testing delays.**

## Short Takes

**Schaumburg, Ill.-based MOTOROLA INC. reported a $1.4 billion third-quarter net loss and said it plans to cut another 3,000 jobs by year's end, plus 4,000 more through the planned sale of business units. . . . Struggling Dublin-based security software vendor BALTIMORE TECHNOLOGIES PLC tapped Bijan Khezri to take over as CEO. Khezri joined the company's board in July.**

# Sun Attempts to Woo Users Away From IIS

*Discounts, technical help aimed at getting users to switch Web servers to iPlanet*

BY JAIKUMAR VIJAYAN

Looking to capitalize on the security problems that have afflicted Microsoft Corp.'s Internet Information Server (IIS) software, Sun Microsystems Inc. last week announced a program aimed at luring users to switch to the iPlanet Web Server package it sells.

But analysts said the cost and effort involved in such moves aren't likely to be trivial, especially for large companies.

Sun is offering a temporary 37% discount on iPlanet to users of IIS or other Web server packages, lowering the per-CPU cost of the software from $1,495 to $940 through next March. It also released detailed technical information on how to make the transition and is providing free ChiliSoft software that lets users run some Microsoft Active Server Pages code unchanged on iPlanet-based servers.

Sun officials said the move was inspired by a report released last month by Gartner Inc. in which the Stamford, Conn.-based consulting firm advised users to consider alternative Web server products after IIS was hit hard by both the Code Red and Nimda worms.

"Microsoft and IIS have taken it on the chin recently," said Evan Quinn, an analyst at Hurwitz Group Inc. in Framingham, Mass. "[Sun] sees this as a market opportunity to go out and try to win some business."

But while Sun claims to have made it as easy as possible for users to move to iPlanet, Quinn said doing so will still pose technical challenges.

Russ Cooper, an analyst at Herndon, Va.-based TruSecure Corp., said many of the security woes affecting IIS-based servers have been caused more by users failing to configure or patch the software properly than by design failures.

For example, both Code Red and Nimda exploited an IIS security hole that could already have been plugged by a patch from Microsoft. Cooper said it may be more cost-effective to better secure existing IIS installations than to replace them with another technology.

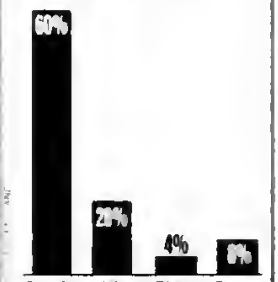
Sun's iPlanet trails far behind both the open-source Apache Web server technology and IIS in usage, according to a survey conducted last month by U.K.-based consultancy Netcraft Ltd. (see box).

Netcraft said it also found that about 150,000 active IIS sites spread over 80,000 IP addresses have been taken offline since the Code Red II worm struck in August. But only 2,000 of those sites have been put back online using a rival Web server product, Netcraft added.

Sun's move came a week after Microsoft announced an initiative aimed at making it easier for users to protect IIS and its other products.

### Web Server Usage

*The most prevalent Web server software technologies, on a worldwide basis*




Base: 32.4 million Internet-connected systems surveyed last month via automated HTTP requests

# Buyer of Nortel's CRM Unit Shifts Strategy

*Amdocs to focus on customers in communications*

BY MARC L. SONGINI

Two years after customer relationship management (CRM) software vendor Clarify Inc. was bought by Nortel Networks Corp., its users now face the prospect of another new owner that plans to focus on the telecommunications and network services industries.

Chesterfield, Mo.-based Amdocs Ltd., which makes business applications for communications companies, this month agreed to buy Clarify for about $200 million — a far cry from the $2.1 billion that now-struggling Nortel paid for the CRM operation. Amdocs said the deal is aimed at giving it more inroads with providers of communications services.

Clarify's software will be tightly integrated with Amdocs' communications-oriented applications, said Avi Naor, the company's president and CEO. For users in other industries, he added, Amdocs will work with systems integrators and other partners to continue offering a stand-alone version of Clarify's CRM products.

Analysts said the change in ownership could have a mixed impact on Clarify's users.

Brian Bingham, an analyst at IDC in Framingham, Mass., said CRM hasn't been a strong point for Nortel. Clarify's strategic fit within Brampton, Ontario-based Nortel "was never square from the outset," Bingham said.

However, Clarify users outside the telecommunications industry "should expect support for their applications to dwindle as deeper teleco specialization ensues" under Amdocs, according to a report on the planned acquisition by Steve Bonadio, an analyst at Meta Group Inc. in Stamford, Conn.

Joanie Rufo, an analyst at Boston-based AMR Research Inc., said in another report that Nortel had let development of Clarify's call center and customer service applications wither. But Amdocs' strategy could prompt many users to re-evaluate their Clarify investments, she added.

### Software Sale

***Key details about Amdocs' planned acquisition of Clarify, which is due to be completed in December:***

**REVENUE:** $1.1 billion for Amdocs in the first nine months of the fiscal year that ended Sept. 30; not available for Clarify

**APPLICATIONS:** CRM, billing and order management for Amdocs; call center, customer service and sales for Clarify

**MARKETS:** Communications for Amdocs; communications, financial services, manufacturing and others for Clarify

## BRIEFS

### Microsoft Signs On As Groove Investor

**Microsoft Corp. agreed to invest about $51 million in Groove Networks Inc., a Beverly, Mass.-based vendor of peer-to-peer collaboration software that was founded by former lead Lotus Notes developer Ray Ozzie. Microsoft will get an unspecified minority equity stake for its investment, which accounted for most of a $54 million cash infusion that Groove announced.**

### Commerce One to Fall Short on Q3 Results

**Business-to-business software vendor Commerce One Inc. warned that its third-quarter financial results will be lower than anticipated, saddling the Pleasanton, Calif.-based company with its third straight weak quarter. Commerce One said it now expects to report an operating loss of up in $49 million on revenue of about $83 million. That's down from $112.7 million in revenue in last year's third quarter.**

### Transmeta Delays Crusoe Upgrade

**Santa Clara, Calif.-based chip maker Transmeta Corp. said the third-quarter revenue it will report could be as much as 50% below earlier projections. The company also postponed the planned shipment of a new version of its Crusoe processor for laptop PCs until later this year because of testing delays.**

### Short Takes

**Schaumburg, Ill.-based MOTOROLA INC. reported a $1.4 billion third-quarter net loss and said it plans to cut another 9,000 jobs by year's end, plus 4,000 more through the planned sale of business units. . . . Struggling Dublin-based security software vendor BALTIMORE TECHNOLOGIES PLC tapped Bijan Khezri to take over as CEO. Khezri joined the company's board in July.**

# Sun Attempts to Woo Users Away From IIS

*Discounts, technical help aimed at getting users to switch Web servers to iPlanet*

BY JAIKUMAR VIJAYAN

LOOKING TO capitalize on the security problems that have afflicted Microsoft Corp.'s Internet Information Server (IIS) software, Sun Microsystems Inc. last week announced a program aimed at luring users to switch to the iPlanet Web Server package it sells.

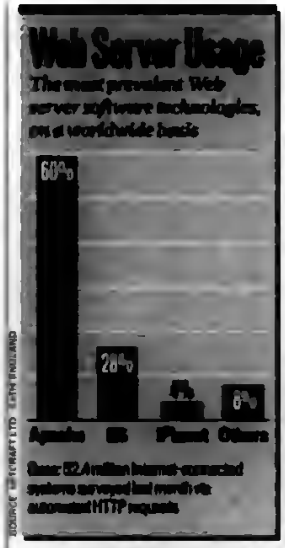
But analysts said the cost and effort involved in such moves aren't likely to be trivial, especially for large companies.

Sun is offering a temporary 37% discount on iPlanet to users of IIS or other Web server packages, lowering the per-CPU cost of the software from $1,495 to $940 through next March. It also released detailed technical information on how to make the transition and is providing free ChiliSoft software that lets users run some Microsoft Active Server Pages code unchanged on iPlanet-based servers.

Sun officials said the move was inspired by a report released last month by Gartner Inc. in which the Stamford, Conn.-based consulting firm advised users to consider alternative Web server products after IIS was hit hard by both the Code Red and Nimda worms.

"Microsoft and IIS have taken it on the chin recently," said Evan Quinn, an analyst at Hurwitz Group Inc. in Framingham, Mass. "[Sun] sees this as a market opportunity to go out and try to win some business."

But while Sun claims to have made it as easy as possible for users to move to iPlanet, Quinn said doing so will still pose technical challenges.




Russ Cooper, an analyst at Herndon, Va.-based TruSecure Corp., said many of the security woes affecting IIS-based servers have been caused more by users failing to configure or patch the software properly than by design failures.

For example, both Code Red and Nimda exploited an IIS security hole that could already have been plugged by a patch from Microsoft. Cooper said it may be more cost-effective to better secure existing IIS installations than to replace them with another technology.

Sun's iPlanet trails far behind both the open-source Apache Web server technology and IIS in usage, according to a survey conducted last month by U.K.-based consultancy Netcraft Ltd. (see box).

Netcraft said it also found that about 150,000 active IIS sites spread over 80,000 IP addresses have been taken offline since the Code Red II worm struck in August. But only 2,000 of those sites have been put back online using a rival Web server product, Netcraft added.

Sun's move came a week after Microsoft announced an initiative aimed at making it easier for users to protect IIS and its other products.

# Buyer of Nortel's CRM Unit Shifts Strategy

*Amdocs to focus on customers in communications*

BY MARC L. SONDINI

Two years after customer relationship management (CRM) software vendor Clarify Inc. was bought by Nortel Networks Corp., its users now face the prospect of another new owner that plans to focus on the telecommunications and network services industries.

Chesterfield, Mo.-based Amdocs Ltd., which makes business applications for communications companies, this month agreed to buy Clarify for about $200 million — a far cry from the $2.1 billion that now-struggling Nortel paid for the CRM operation. Amdocs said the deal is aimed at giving it more inroads with providers of communications services.

Clarify's software will be tightly integrated with Amdocs' communications-oriented applications, said Avi Naor, the company's president and CEO. For users in other industries, he added, Amdocs will work with systems integrators and other partners to continue offering a stand-alone version of Clarify's CRM products.

Analysts said the change in ownership could have a mixed impact on Clarify's users.

Brian Bingham, an analyst at IDC in Framingham, Mass., said CRM hasn't been a strong point for Nortel. Clarify's strategic fit within Brampton, Ontario-based Nortel "was never square from the outset," Bingham said.

However, Clarify users outside the telecommunications industry "should expect support for their applications to dwindle as deeper teleco specialization ensues" under Amdocs, according to a report on the planned acquisition by Steve Bonadio, an analyst at Meta Group Inc. in Stamford, Conn.

Joanie Rufo, an analyst at Boston-based AMR Research Inc., said in another report that Nortel had let development of Clarify's call center and customer service applications wither. But Amdocs' strategy could prompt many users to re-evaluate their Clarify investments, she added.

### Software Sale

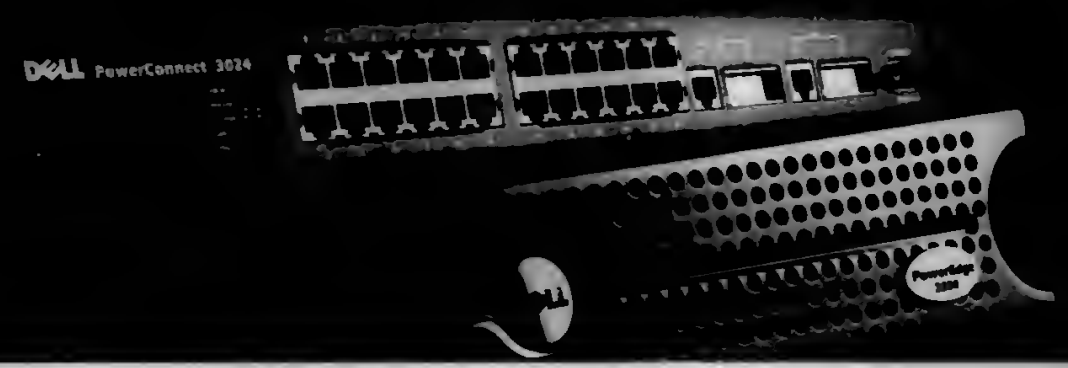
*Key details about Amdocs' planned acquisition of Clarify, which is due to be completed in December:*

**REVENUE:** $1.1 billion for Amdocs in the first nine months of the fiscal year that ended Sept. 30; not available for Clarify

**APPLICATIONS:** CRM, billing and order management for Amdocs; call center, customer service and sales for Clarify

**MARKETS:** Communications for Amdocs; communications, financial services, manufacturing and others for Clarify

# Introducing Dell PowerConnect Network Switches




**Dell** | Small Business

## PowerConnect™ 2016/2024 Switch

Cost-Efficient and Easy-to-use Unmanaged Switches
- 16 and 24 Port Fast Ethernet Switches
- Easy to Install. No Configuration Needed
- Slim, Rack Mountable 1U Form Factor
- 1-Yr NBD Parts Included*

From
**$169**

**Recommended upgrade:**
- 3-Yr NBD Parts*, from $29.99

## PowerConnect™ 3024 Switch

Scalable, Flexible Managed Switches
- 24 Fast Ethernet Ports plus 2 Gigabit Ethernet Ports
- 12.8 Gbps of Total Switching Capacity
- Remote Access and Management Capabilities
- Built-in 2 GBIC Slots and 2 Gigabit Ethernet Ports
- 3-Yr NBD Parts Included*

**$699** Business Loan $19/mo. 48 mos.

**Recommended upgrade:**
- 3-Yr 4 Hour Parts* (7x24), add $79.99

## PowerConnect™ 5012 Switch

High Performance All-Gigabit Managed Switches
- 10 Full Wire-Speed Copper Gigabit Ports
- 24 Gbps of Total Switching Capacity
- Built-in 2 GBIC Slots for Copper or Fiber Uplinks
- Remote Access and Management Capabilities
- 3-Yr NBD Parts Included*

**$1299** Business Loan $35/mo. 48 mos.*

**Recommended upgrade:**
- 3-Yr 4 Hour Parts* (7x24), add $129.99

## PowerEdge™ 500SC Server

NEW Basic Server at Our Lowest Price
- Intel® Celeron® Processor at 900MHz
- 128MB 133MHz ECC SDRAM
- 20GB* (7200 RPM) IDE HD
- Embedded Intel® 10/100 NIC
- 48X Max IDE CD-ROM
- 1-Yr NBD On-Site Service† 1-Yr Parts*
- 7x24 Phone Tech Support

**$629** Business Loan $17/mo. 48 mos.
E-VALUE Code: 10219-291106

**Recommended upgrades:**
- Intel® Pentium® III Processor at 1.0GHz, add $200
- Same-Day Service 4-hour (5x10) On-Site Service**, add $349

## PowerEdge™ 2550 Server

NEW Scalable, Rack-Optimized Server
- Intel® Pentium® III Processor at 933MHz
- Dual Processor Capable
- 256KB Integrated L2 ECC Cache
- 128MB 133MHz ECC SDRAM
- 18GB 10,000 RPM Ultra3 SCSI HD
- 2 Embedded NICs • One Gigabit and One Intel 10/100
- 3-Yr NBD Bronze On-Site Service

**$1899** Business Loan $50/mo. 48 mos.
E-VALUE Code: 10219-291110

**Recommended upgrades:**
- Redundant Power Supplies, add $229
- Embedded Dual-Channel RAID, add $299

**Oh, did we mention that you can save up to 50% or more on our switches versus those other switches?** When you combine reliable Dell PowerEdge™ servers -- powered by Intel® Pentium® III Processors -- with Dell PowerConnect™ Network Switches, you can expand your network without breaking the bank. And we're all backed by Dell's award-winning service and support. Which means you get one single point of contact. So, whether you're expanding your network with Dell PowerEdge servers or with Dell's new line of PowerConnect Network Switches, you get quality technology at an affordable price.

intel inside pentium III

**Growing your network. Easy as DELL**

**Visit www.dell.com/switch or call toll free 1-800-545-7133.**

**Dell PCs use genuine Microsoft® Windows®**
**www.microsoft.com/piracy/howtotell**


VALUE

USE THE POWER OF THE E-VALUE CODE
Match our latest technology with our latest prices. Enter the E-VALUE code online or give it to your sales rep over the phone.

RETURN ON COMMUNICATIONS

Your network is what sparks your business. And your business results. Maximizing these results is what we call Return on Communications. Designing, building and implementing the right networking solutions can optimize your operations and applications for greater growth and increased efficiency.

**AT&T unlocks the value of your network.**

No other company has AT&T's unique combination of Skill, Scale and Scope to do this for your business.

- 36,000 networking professionals to support you globally
- Best performing IP and data networks
- Broad services portfolio with industry-leading SLAs
- Greatest reach: 59 countries, 850 cities

# ENERGIZING
## YOUR BUSINESS FROM THE INSIDE OUT

**Results that businesses rely on.**

Revitalizing businesses from the inside out is what AT&T thrives on. That's why today, four million businesses all over the world and across every industry, put their trust in AT&T.

- 100% of the FORTUNE 100™
- Top 10 US Retailers
- Top 10 Banks / Financial Services Companies

**Let AT&T help you recharge your business.**

- From local to global
- From legacy to next generation networks
- From self-managed services to fully-managed solutions

Find out how AT&T can energize your business and help you see a higher return on your communications.
**Call us today toll free at 1 866 636-0828 or visit www.attbusiness.com/return**

AT&T

©2001 AT&T

PATRICIA KEEFE

# Code Warriors

**IT'S NOT LIKE ANY PREVIOUS ENGAGEMENTS we've fought, but we are at war, and IT will be on the front lines. Given that the military and terrorists alike run on technology, we're looking at the first real generation of code-to-code combat.**

We have entered an era when conventional weapons are guided by computers, attacks are as likely to be electronic as they are physical, and nonmilitary data networks and resources are prime targets. All of which puts IT professionals in the spotlight, and on the spot, tasked with shoring up our defenses.

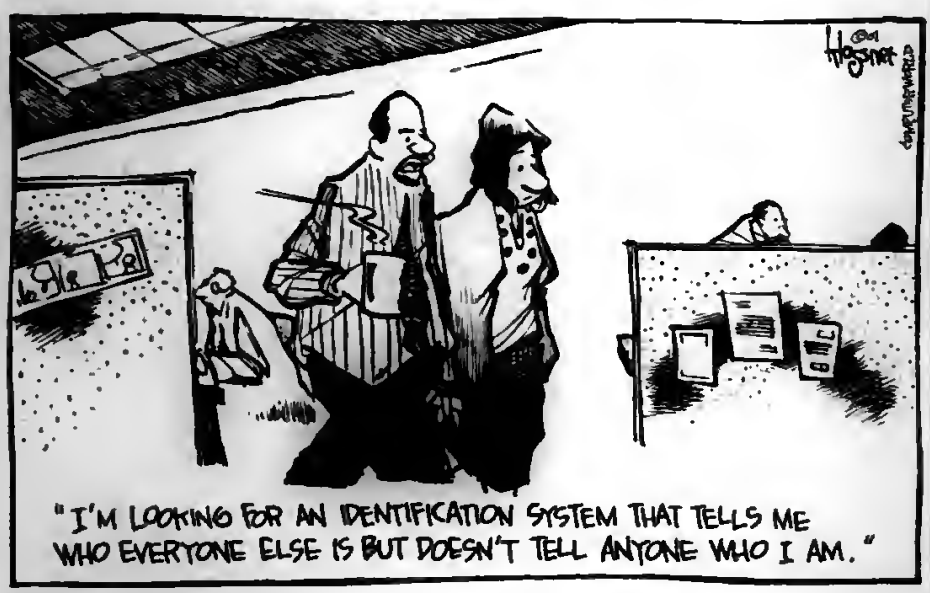
PATRICIA KEEFE is editorial director at *Computerworld*. You can contact her at patricia_keefe@computerworld.com.

Private-sector owners of critical-infrastructure facilities and networks have been put on highest alert. For all IT departments, this should translate into nailing down security, disaster and cootingency planning, policies and procedures. No more fooling around. So:

- If you don't already dedicate a portion of your IT staff and budget to security — make it so.
- If you can't quickly replicate what you've got or restage your system from another location, fix it.
- If your security efforts are split up among different departments or systems, synchronize and coordinate those efforts.
- If the economy spirals lower, budgets may take a hit. You must determine which projects and personnel are critical, which costs can be shifted to user departments and how you are going to prove ROI.
- If you're not prepared for upcoming regulations involving encryption, employee monitoring, protectioo of sensitive technical informatioo and access to privately owned data, get ready. Corporations must develop policies oo how to compile, store and release data to government agencies, according to PricewaterhouseCoopers' national director of privacy practice [News Opinion, Oct. 8].

As noted by columnist Paul A. Strassmann in our Oct. 1 issue, "the freewheeling, undisciplined days of network management practices are over." IT must not only move to secure internal networks, but also work to improve the physical security of its installations everywhere.

It's not hard to see that IT will be in the thick of the battle against terrorism, and that means the country has a lot riding on your performance. It puts new meaning into the old programmer's moniker "code warrior." ◗

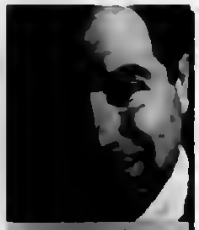



PIMM FOX

# Seeking Comfort And Savings in Managing Storage

**STORAGE-AREA NETWORKS using Fibre Channel have enjoyed widespread acceptance. But SANs come with steep maintenance costs. Almost every time storage is added, new IT personnel must be hired to monitor and maintain the capacity. Indeed, service costs can easily outstrip capital expenses for SAN management.**

And vendors haven't made it any easier. Each has its own proprietary firmware, making it all but impossible to get a single view of a multivendor environment.



PIMM FOX is *Computerworld*'s West Coast bureau chief. Contact him at pimm_fox@computerworld.com.

Fortunately, several solutions on the horizon may offer some relief.

InfiniBand, a nonproprietary replacement for Fibre Channel, makes it possible for software companies to create automated monitoring, policy-based management and self-healing applications. Customers can also connect their hardware in a single server network, making it easier for IT personnel to manage storage capacity.

Compared with Gigabit Ethernet and Fibre Channel, cost savings for InfiniBand could be as much as 50%.

"You can also create partitions within the network, so applications don't interfere with each other," says Bill Leddy, CTO at Lanel5 Software, an Austin, Texas-based maker of InfiniBand management software. "And you get the same benefit as having all the storage in one piace, as you doo't have to move cables," he adds.

The other opportunity for storage managemeot savings is the reintroduction of network-attached storage. Using NAS boxes with management software already installed could permit IT personnel to view storage operations oot as a bevy of components, but rather as an eotire system whose efficiency and operations are automated and guided by predetermined service levels.

Complaints about NAS performance are being addressed by companies such as Fremont, Calif.-based Zambeel. It's creating clusters inside the storage appliance, along with a shared file system.

**Quick Link** For more *Computerworld* columnists and links to archives of previous columns, head to: www.computerworld.com/q?q1000

"People think in terms of files," says Darren Thomas, Zambeel's president and CEO, "not in terms of blocks, which is what SANs deal with."

The company's master virtualizatioo software in the NAS box automatically manages the system as a whole unit, not the individual pieces of the storage system.

One poteotial problem with NAS boxes is that they are still connected using Ethernet, which is slower than InfiniBand. But combining NAS with InfiniBand could remove this obstacle.

For personnel currently using Sun, IBM, EMC or HP SANs with Brocade switches, it's obvious there woo't be one package to manage all aspects of a SAN for a while. But just as SANs were better for IT folks who had to manage distributed storage needs, InfiniBand and NAS could offer similar comfort (and cost savings) for those using SANs.

DAN GILLMOR

# Preparedness Places Special Urgency on IT

THE PEOPLE in the trenches have been the heroes since the Sept. 11 atrocities — firefighters, police, construction workers. In a less visible way, so have the people who've restored communications and other crucial infrastructure.

In the latter category, give a particular nod to the IT folks who planned for disaster, theo prevailed on their bosses to be prepared. When the worst happened, they had more options than people who weren't ready.

DAN GILLMOR is technology columnist at the *San Jose Mercury News*. Contact him at dgillmor@sjmercury.com.

Backing up crucial data off-site has been a standard practice for many companies. But Sept. 11 boosted the rationale for decentralization of a more profound kind — including people and data — and it has absolutely forced a reassessment of the technology all companies will need to stay in business in tomorrow's changed climate.

The value in spreading out computing resources, not just data, is also clearer than before. This has been true for serving up Web pages, but it may make just as much sense for processor-intensive tasks. Recovery and redundancy are about more than reloading data.

Some of the companies that were located in the World Trade Center will return to lower Manhattan. Some won't. All, surely, are thinking about spreading out their workforces in ways they may not have contemplated before.

They can imagine doing this in part because of the innovation that has come along in the past decade and cootinues to pour out of corporate research labs and start-ups. We can commuoicate far better today across distances, and the tools of remote collaboration keep improving each year. The hard new look at videoconferencing, for example, is persuading previous skeptics that face-to-face meetings can freqoeotly be virtual with little or oo loss in effectiveness.

Security must also be at the top of the to-do list today and tomorrow. Software vendors have been shamefully lax in this category over the years, forcing IT to work much harder than is reasonable to keep data safe. It's high time that IT insisted on real protection, since the consequences of a potential cyberattack are too high to discount anymore.

Given law enforcemeot's plans to massively boost electronic surveillance, with the atteodant problems that may create, businesses should be looking harder at encryption for vital data. If your company's sensitive e-mail isn't encrypted today, it could be on someone else's hard disk tomorrow.

IT will be asked to come up with solutions on reduced budgets. Deciding how to satisfy the competing demands from all corners of the enterprise will be tough, but some priorities should be obvious. The first priority, of course, is people. But if data — and the ability to bring systems back online — disappears in a disaster, the company may not recover.

Decentralization must be coupled with security and reliability. They reinforce one another. Demand more security from vendors and take a pass on the whizzy features you don't absolutely need.

Since Sept. 11, most of us have looked deep inside. At home and at work, taking note of risks we'd mostly dismissed or ignored, we've beeu forced to re-examine what matters.

We can pray that anotber attack like that one won't occur, despite Osama bin Laden's threat of a holy war, and we can do our utmost to prevent it. Yet it would be irresponsible to assume the best. Murphy's Law still applies, and Murphy has some extraordinarily evil cousins. Be prepared.

# READERS' LETTERS

## Laws Enough Already

IT'S TRULY refreshing to hear a public servant call for better enforcement of existing laws instead of the creatioo of new ones ["FTC Shifts Focus to Enforcement," Page One, Oct. 8]. I am pessimistic, but I think most legislatioo is just "grease" for the popularity mill we call democracy.

**Clifford Smithson**
Washington, Ga.

## IIS: Don't Start Over

THOSE OF US who take the time to secure IIS out of the box and use the Windows Critical Update feature don't have the problems that have plagued other IIS users. Granted, IIS could be more secure out of the box, but the fact is that lazy, hands-off administration will get you burned on any server platform sooner or later. But I disagree with Frank Hayes about rewriting IIS from the ground up ["Time to Retool IIS," The Back Page, Oct. 1]. It's only through the process of "trial, error, patch" that server apps become secure, or rather, before they get the reputation for being secure, since nothing is ever truly 100% secure. Why start all over? I'm no Microsoft sycophant, but Windows 2000 is doing better this year in the vulnerability count standings than several products based oo Unix or Linux. Shouldn't that count for something, considering the fact that the Unix code base is approaching 30 years of age?

**Jacob Price**
Director of product development
Data Strategies Inc
San Diego
jacobp@e-dsi.com

I AGREE WITH Frank Hayes. However, CTOs and CIOs have a harder job than just looking at the oumbers. They have to convince the executives who told them to buy IIS that it isn't a good idea to use a toy in serious workplace environments. It's like using a bicycle to tow a semi.

**Randy Neumann**
Salt Lake City

## Is Anybody in There?

REGARDING "Computer Associates Retools, Touts Open-Door Philosophy" [Cover Story, Sept. 24], when project sponsors state the same philosophy to me, my question to them is, "When your door is open, are you in there?"

**Gopal K. Kapur**
President
Center for Project Management
San Ramon, Calif.

## A Shameful Excuse

IT'S SHOCKING how many companies claim the Sept. 11 disaster as the reason for missing their marks. Do they expect shareholders to believe that events that happened two weeks before the end of the quarter caused them to miss the mark for the quarter? And are we to believe that these companies are so dynamic that they have been able to assess the impact the attacks will have on their revenues in coming years? Executives at these companies are using the attacks as a way to justify their inability to manage their companies in an economic downturn and to take the heat off from angry shareholders and employees. It's a shameful display of opportunism.

**Jonathan Earp**
CIO/vice president
Informa Financial Information
Westboro, Mass.

**COMPUTERWORLD** welcomes comments from its readers. Letters will be edited for brevity and clarity. They should be addressed to Jamie Eckle, letters editor, Computerworld, PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701. Fax: (508) 879-4843. Internet: letters@computerworld.com. Include an address and phone number for immediate verification.

Quick Link For more letters on these and other topics, visit our Web site: www.computerworld.com/c?a2000

# No amount of profanity will bring your data back.

Put an end to [illegible] with the MaxAttach® NAS 4300 file server from Maxtor Corp. The MaxAttach 4300 with Persistent Storage Manager (PSM) attaches to your network via Ethernet and automatically takes snapshots of your file system as often as you tell it to. Making data recovery easier than ever. And like all of our NAS 4000 Series products, it provides disk storage for the cost of tape. So while profanity won't bring your data back, the new MaxAttach 4300 will. Compare the MaxAttach 4000 Series to other storage solutions with the MaxAttach Storage Calculator at **www.maxtor.com/netstor** or call **1-800-240-9778**

MaxAttach NAS 4300
File Server

NETWORK STORAGE YOU CAN USE

Maxtor

VERITAS otg LEGATO

Windows Powered

# Smart Storage

Faced with growing demands, immature tools and a confusing array of technologies, IT managers have to make some strategic decisions.

ALLEN CRAWFORD/PLANKTON ART

EDITOR'S NOTE

## Hoarders Anonymous

**NOT LONG AGO, *Computerworld*'s IT department sent a few of us staffers the following alert: "You have made it to our E-mail Hit List. When we ran reports on the server, your e-mail file made it to the top of the list." Then came suggestions on how to clear out the stockpile of e-mail that was clogging our server.**

OK, I'm guilty: I'm an e-mail pack rat. Even my Yahoo account flashes a warning about exceeding my storage quota. My only defense is that my e-mail folders (I prefer to call them my "unstructured text database") aren't collecting just text anymore; now they're bulging with graphics and audio file attachments, too.

I must not be alone. Researchers estimate that worldwide e-mail storage amounted to 900TB last year and will grow 40% per year. Managing this growth is a huge challenge for IT storage professionals, but it's not the only one. Internet downloads, digital photos, enterprise resource planning systems and data warehousing are all conspiring to create a storage crisis.

STORAGE

IT managers need to keep pace with these applications — whose storage requirements double every year — while cramming as much data as possible on existing devices. The problem is that storage management tools are immature, and there are a confusing array of technologies coming on the market.

The goal of this special report is to help you get smart about the technology choices and help you avoid the 12 mistakes storage managers tend to make (see page 44). Pay careful attention to Mistake No. 1 — the one where you decide on the technology before figuring out your current and future business requirements for data storage. In the course of this project, I've learned that that's definitely not a smart move. I hope you'll learn something, too.

*Mitch Betts is director of* Computerworld's *Knowledge Centers. Contact him at mitch_betts@computerworld.com.*

**ONLINE EXCLUSIVES**

■ You'll find additional stories and resources in the online Storage Knowledge Center: www.computerworld.com/q?k1700

ALLEN CRAWFORD/BLANKTON ART

# The Data S

## Users need to pack more data onto existing storage systems, but storage management tools are still in their infancy. By Robert L. Scheier

HOW COMPLICATED CAN storage management be?

Just ask Michael Harvey, senior systems programmer at office products retailer Office Depot Inc. in Delray Beach, Fla. He's using IBM's well-established, system-managed storage tool in a mature mainframe environment. But he still found 1.2TB of data that should have been deleted taking up space on tape backups. Why? Because a developer had changed the names of some of the data sets without telling the storage administrators.

With IT managers under pressure to hold down spending, they can't afford to have huge amounts of unused disk or tape space — nor can they afford to hire hordes of new storage management specialists.

It's bad enough in a mainframe-only environment with only one operating system and one or two types of physical storage. Storage management gets far more complicated in a network storage system that has disk arrays, switches, host bus adapters and server operating systems from a host of different vendors.

That's why users such as Harvey are pressing vendors for tools that can manage storage hardware and software from a variety of vendors. They also want tools that can work with one another, as well as with broader management frameworks, to squeeze the most out of storage resources.

For example, Harvey manages 10TB of mainframe direct-access storage device (DASD), to which he has been adding 1.7TB to 2TB per year. "This year, we're going to keep the growth down to 1 to 1.2TB" by eliminating unneeded files and making sure that users actually need all the space they have requested for their applications, he says. "We don't want to have to buy DASD this year, because it would just

be too much of an expense," adds Harvey.

IT managers running distributed systems such as Unix and Windows often manage the same amount of data that used to be found only on a mainframe. In a distributed environment, however, they lack the sophisticated data management tools that allow mainframe managers to predict and monitor storage growth to make the best use of their disk space.

Because of the lack of robust cross-platform tools, IT managers must spend extra to buy, support and monitor multiple storage-monitoring applications for different application types, storage hardware or server operating systems. It's also harder for them to configure their storage to maximize its reliability, performance and fault tolerance.

Perhaps worst of all, customers wind up buying expensive new storage hardware while space goes unused on existing drives, because they have no easy way to find the unused space and transfer data into it. In fact, says New York-based storage consultant Stevan Arbona, avoiding the cost of buying new storage hardware "is where the biggest win is in using a storage management tool."

## Management Layers

Storage management is the practice of fine-tuning how data is distributed among disk or tape drives so that it can be stored and retrieved in the most cost-effective way, as well as kept secure and backed up in case of a system failure.

Storage management can be divided into different levels of capabilities, from the least- to most-complicated (see chart). The first level is storage resource management (SRM), says Arun Taneja, a senior analyst at The Enterprise Storage Group Inc. in Milford, Mass. At this level, tools simply map the existing physical and logical storage devices and show how they're being used.

SPECIAL REPORT STORAGE

Although SRM is fairly mature in mainframe environments, in the distributed world of Unix and Windows servers, it's still "in its infancy," Taneja says. One of the leaders in this category, he says, is Sun Microsystems Inc.'s HighGround Storage Resource Manager. Newer players include TrelliSoft Inc., W. Quinn Associates Inc., TeraCloud Corp. and BMC Software Inc. Taneja advises IT managers to carefully check which platforms an SRM tool supports. For example, HighGround began its life supporting only Windows NT and added Unix support about a year ago, he says.

The second level of tools handles data management, which means keeping data secure and available, and includes common capabilities such as data backup, replication and restoration. Tools in this category are the most mature of any of the four levels, Taneja says, and include offerings from Veritas Software Corp., Legato Systems Inc. and Computer Associates International Inc.

Storage network management is the third level, and as the name implies, it involves identifying and monitoring the performance of components in a storage network, such as hubs, switches, disks or host-based arrays.

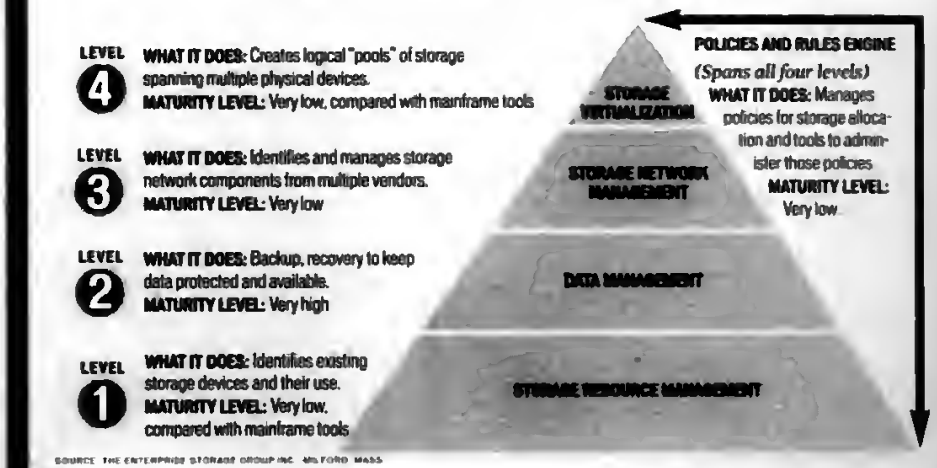
Tools in this category can also deliver information about the performance of those components and have some rudimentary ability to tune their performance, Taneja says. Vendors with tools in this level include BMC, Veritas and McData Corp., which recently announced plans to purchase SANavigator Inc. from Western Digital Corp.

The fourth level is storage virtualization, or the ability to treat a number of physical storage devices as a single, logical unit. Again, though this capability is widely available in the mainframe world, it has begun to emerge in the open systems world only in the past 18 months, says Taneja, with Fort Lauderdale, Fla.-based DataCore Software Corp. being the pioneer vendor.

To make things more complicated, some vendors want to perform storage management at the server; others want it in the storage-area network (SAN) "cloud" and still others at the level of the individual storage device. Storage management ideally must also span different types of storage, ranging from SANs to network-attached storage to direct-attached storage within servers to JBOD (just a bunch of disks) linked to servers via SCSI connections.

## Storage Software Pyramid

*In this view of the storage management software market, the highest layer has the fewest tools yet is the most valuable.*




SOURCE: THE ENTERPRISE STORAGE GROUP INC., MILFORD, MASS.

## Multiple Vendors

Fox Filmed Entertainment, the New York-based film and TV production arm of The News Corp., runs everything from mainframes to an AS/400 environment as well as Sun and Compaq Computer Corp. servers, says chief data center architect Richard Smolinski. To manage his 20TB of storage (which he expects to double by the middle of next year), Smolinski is relying on Compaq's VersaStor technology for SAN virtualization.

VersaStor consists of management software, appliances and agent technology to provide storage pooling across multiple server operating systems and across SAN hardware and software from multiple vendors. Smolinski says he expects VersaStor will allow him to combine storage and storage management tools "under one umbrella."

For now, though, many storage management tools work with only one vendor's storage devices or one vendor's storage management software. For example, Compaq is focusing on integrating its storage management tools with network and systems administration frameworks such as Islandia, N.Y.-based CA's Unicenter and Hewlett-Packard Co.'s OpenView, a Compaq spokesman says.

queeze

# The Data Squeeze

*Continued from page 37*

While he's pleased with the direction Compaq is taking with VersaStor, Smolinski says he would like to see better integration of the management tools and the ability to delegate responsibility for storage management among business units, in much the same way that Active Directory divides responsibility for network security and administration.

Arbona raises another interoperability issue: How do you manage storage associated with different types of applications, such as databases or messaging systems? Sun claims that the most recent release of HighGround includes new capabilities to analyze and manage storage of data in Oracle Corp. and Sybase Inc. databases.

## Robust Reporting

In the rush to create new applications, developers will often crowd data onto the wrong storage device while the proper device sits almost empty, says Office Depot's Harvey. So storage management tools need robust, intuitive reporting capabilities to allow storage administrators to quickly discover and fix such problems, he says. Harvey says he uses a suite of five management products from Bellevue, Wash.-based TeraCloud because of their flexibility and ease of use in creating reports.

"I don't want to have to code things," says Harvey. "I don't want to have to run jobs that take hours and hours to find out one bit of information." He likes TeraCloud's ability to create reports using different criteria, which applications in the suite can save for reuse, "so you don't have to continually go in and redo [the reports] all the time," he says.

Harvey says he could use the TeraCloud suite to track data usage by application or business unit to charge business units for their storage use. That would show business managers how much storage is being used by various departments and applications — and it might make them think twice before leaving massive, unused files on disk for years at a time.

Steve White, vice president of information systems services at Jersey City, N.J.-based Insurance Services Office Inc., manages 5TB of mainframe storage and another 1.5TB in a distributed PC/Unix environment. He expects that amount to increase by 2TB next year and is using CA-Vantage to analyze storage demand trends, predict future needs and plan storage budgets with the business units.

He estimates, however, that 40% of the space allocated to specific applications on his company's storage devices goes unused for long periods of time and thus could be stored on less expensive, but slower, tape drives. For that, he hopes vendors develop a hierarchical storage management (HSM) tool that would work in the distributed environment as well as HSM now works on mainframes.

## A Sampling of Strategies

*The following are some examples of storage-management products from key vendors:*

| | | |
|---|---|---|
| Computer Associates | CA-VANTAGE | Provides analysis, reporting and remote task execution in Windows, Unix and Linux environments. |
| | CENTRALIZED ENTERPRISE STORAGE MANAGER | Due in nine months, Centralized Enterprise will first work only with CA's management applications; support for other vendors' tools is expected within two years. |
| Compaq | VERSASTOR | SAN-wide virtualization hardware, software and management tools. |
| | OPEN SAN | Framework for storage management applications that includes application programming interfaces for linking to broader management frameworks such as Tivoli Systems Inc.'s Manager/Enterprise. |
| | SANWORKS NETWORK VIEW | Provides a view of the entire SAN; captures events and alerts and potential trouble spots. Provides central console for managing individual elements such as switches and storage arrays. |
| EMC | CONTROLCENTER SUITE | Includes resource availability application for managing logical storage resources on MVS, Unix and Windows servers. |
| | ESN MANAGER | Provides graphical user interface for managing switches, host bus adapters from EMC as well as selected other vendors. |
| Hewlett-Packard | OPENVIEW STORAGE AREA MANAGER | Five storage management applications bundled into HP's Network Storage Appliance. The suite also supports standard management information bases and messaging technologies for integration with other management tools. |
| | SANLINK, SANLINK STORAGE, SANMASTER | SAN virtualization hardware and software acquired with HP's purchase of StorageApps Inc. |
| | HP OPENVIEW STORAGE ACCOUNTANT | Enables enterprise customers and service providers to monitor and charge for storage usage. |
| Sun Microsystems | STOREDGE QUICK FILE SYSTEM (QFS) AND STORAGE ARCHIVE MANAGER FOR FILE SYSTEMS (SAM-FS) | QFS enables file sharing in a SAN; SAM-FS allows for hierarchical storage management. |
| | HIGHGROUND STORAGE RESOURCE MANAGER | Reports on and analyzes storage use, predicts needs, recommends preventive and repair actions. The latest version includes support for Oracle and Sybase. |

Even more important than the tools, says Taneja at The Enterprise Storage Group, is a central rules engine to store and manage the rules by which storage will be administered across the enterprise. For example, such rules could allow a business to decide how much storage space a general ledger application could consume compared with its enterprise resource planning system and define at what point data from each application would be moved from disk storage to tape drives.

While no such engine now exists, Taneja says components in each of the four layers "have some semblance of policy engines" that storage managers can begin to use.

Beyond specific tools or even specific policies, Arbona argues for a disciplined approach to storage. That means not just adding new storage willy-nilly as demand explodes, but also deciding what data is most important and allocating storage spending accordingly. While it's more work, he says, "it helps you in operational effectiveness, it helps you in risk reduction, and it helps you in cost avoidance." ◗

*Scheier is a freelance writer in Boylston, Mass.*

**ONLINE EXCLUSIVE**

The integration of storage management products from HP and Compaq could be good news for IT managers – but only if the merger doesn't cause too much disruption.
www.computerworld.com/q122632

Choosing a reliable tape storage solution starts
with choosing a reliable storage company.

StorageTek

Your people are hounding you

for more storoge space. Your support stoff hos just been cut. And you've olreody shot your IT budget for the year. You're not olone. The need for storoge is skyrocketing, ond more ond more businesses ore feeling the heat.

The problem is, spending o lot is not on option right now. And while budgets continue to shrink, requirements do not. Leaving you with the responsibility of finding o way to squeeze more efficiency out of the storage resources you olready have.

It would help if your infrastructure were flexible enough to let you pull together oll your mixed-vendor devices so you could freely move doto between them. Thot way you could scale your existing copacity to match your company's unpredictable storoge demonds.

HP's onswer to the challenge is Federated Storoge Area Manogement (FSAM), on inventive opproach that ensures you get the most out of your past, present ond future investments. We stort by helping you manage your entire network's storoge resources—including legacy ond multi-vendor hordware—from the convenience of o single console. All without odding more people.

HP infrastructure solutions—servers, software, storoge, services ond beyond—ore engineered for the real world of business. Because the last time we checked, that's where we oll work. Coll 1.800.HPASKME, ext. 246. Or visit hp.com/go/infrastructure.

Infrostructure: it starts with you.

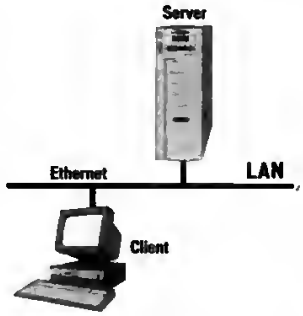
# A Storage Sk

Five back-of-the-envelope diagrams trace the evolution of storage from simply saving a file on a network drive to a complex SAN. By Sami Lais

STORAGE

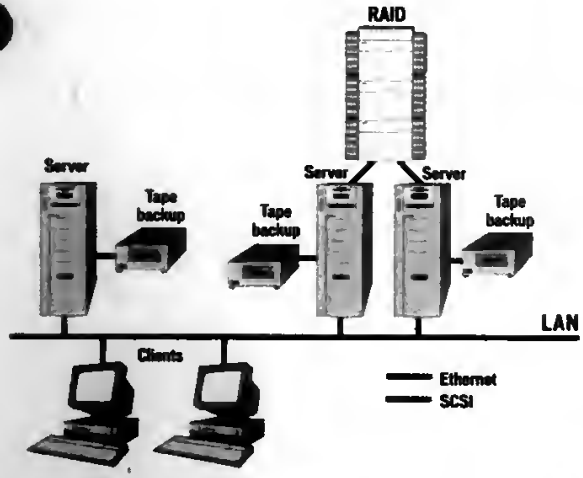
1

## Client/Server Storage at Its Simplest




● In the simplest network storage configuration, a user saves data either to his own PC or over a LAN to a server. This provides the user with backup of important files but is inadequate in all but the smallest of environments, such as a small office or home network.

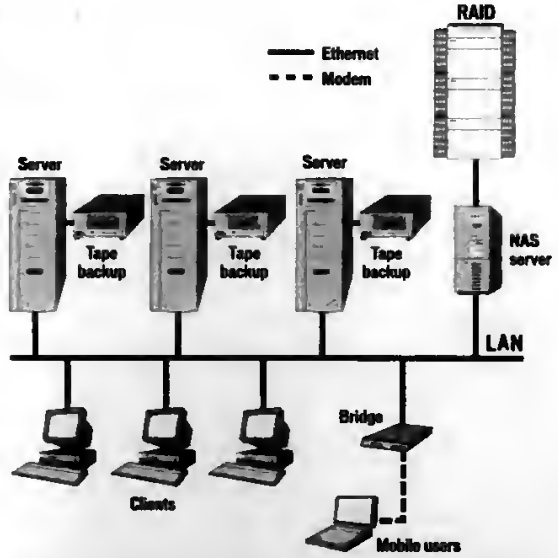
2




## Direct-Attached Storage

● As a network grows, it typically starts with direct-attached storage, in which a server is regularly backed up to tape or a RAID array. There may be multiple servers, such as file servers, database servers and Web servers, each with its own backup tape drive. But tapes must be manually swapped out, and if someone forgets to insert a fresh tape, or if a tape or drive goes bad, the backup doesn't happen. Also, backup schedules typically vary — a production database should be backed up more frequently than an ordinary file server. Tasks such as retrieving single files from a tape can take hours.

3

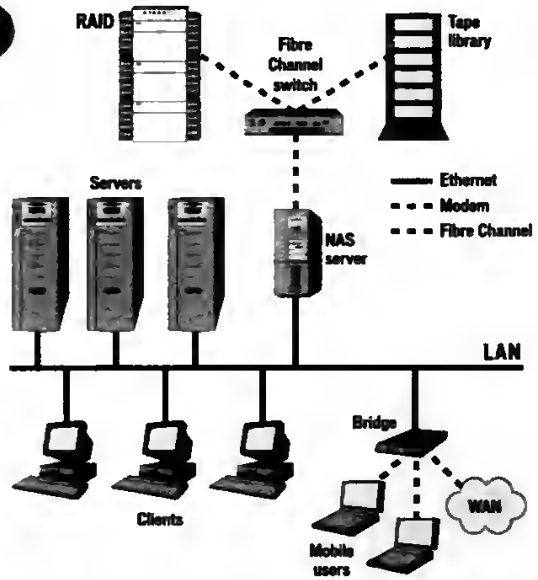



## Network-Attached Storage (NAS)

● By attaching high-speed RAID storage to the network, servers can get data from the RAID array instead of individual servers. The RAID array increases data reliability and redundancy, but it doesn't replace the need for regular backups.

# etchbook

4



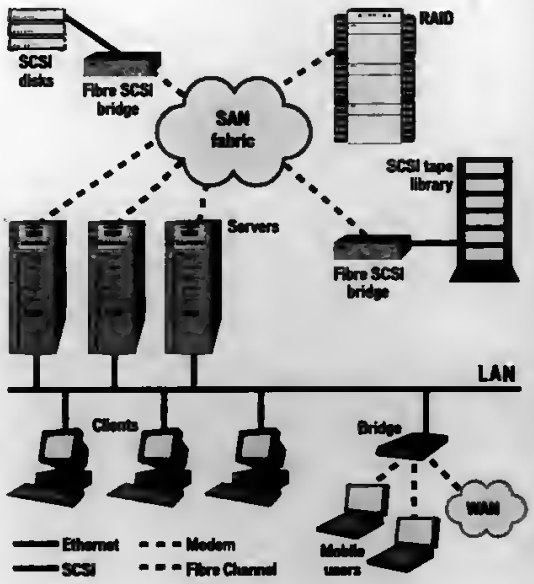

## NAS With a Storage-Area Network (SAN) Subsystem

■ LAN-free backup is enabled through a Fibre Channel subsystem attached to the network via a NAS server, which is directed by a backup server (not shown) via the Network Data Management Protocol. The tape device can back up from data residing on a RAID array, for example, thus placing no extra load on the LAN.

5

## Fibre Channel SAN

■ In a SAN, the SAN fabric typically consists of Fibre Channel hubs, switches and routers working together. The exchange of data among devices occurs at high speed. In a Fibre Channel-Arbitrated Loop SAN, up to 126 devices are connected in a continuous loop, allowing only one pair of devices to communicate at once. A switched fabric allows multiple simultaneous connections. Serverless backup — backing up directly from disks to tape — occurs over the SAN, placing no extra load on the server processors. The proposed third-party copy standard would create a SCSI command that would allow the copying of data from SCSI disks to tape for data archiving.




## Glossary

■ **Fabric:** A combination of interconnected switches that act as a unified routing infrastructure. It allows multiple connections among devices on a SAN and lets new devices enter unobtrusively by log-on.

■ **Fibre Channel:** A high-speed (up to 16 bit/sec.) data transmission technology used to connect multiple hosts to dedicated storage systems over copper or fiber-optic lines.

■ **FC-AL:** Fibre Channel-Arbitrated Loop links as many as 126 devices in a continuous loop as long as 10 kilometers. Relatively low-cost, it lets only one pair of devices on the loop communicate at a time.

■ **FC-EL:** Fibre Channel-Enhanced Loop, still under development, combines aspects of FC-AL and IBM's Serial Storage Architecture to extend loop topologies.

■ **iSCSI:** Cisco Systems Inc. and IBM teamed on this draft spec for storage over IP. It avoids SCSI's latency intolerance and speeds IP packet assembly, thereby reducing latency. It places a heavy load on a server's CPU cycles, however, and will be problematic for applications that don't tolerate latency.

■ **NDMP:** Network Data Management Protocol is an open standard for backing up data in a heterogeneous environment.

■ **RAID:** Redundant array of independent disks is a common system for high-volume data storage at the server level. RAID systems use many small-capacity disk drives, which appear as a single logical unit.

■ **SAN:** A high-speed network for connecting storage devices such as tape libraries and disk arrays, usually over Fibre Channel.

■ **SCSI:** Allows daisy-chaining of SCSI-enabled devices to create a hot-swappable, fault-tolerant RAID cluster.

■ **SOIP:** Storage Over Internet Protocol. San Jose-based Nishan Systems Inc.'s term for linking SCSI and Fibre Channel storage interfaces with IP and Ethernet network interfaces.

■ **Storage tunneling:** Fibre Channel SAN frames are encapsulated in IP packets for transport to another Fibre Channel SAN.

■ **Virtualized storage:** Software controls storage devices, allowing multiple devices to appear as a nondifferentiated pool of storage.

**ONLINE RESOURCES**

■ For more glossaries of storage terminology, visit the Storage Networking Industry Association's Web page or *Computerworld*'s Storage Knowledge Center.

www.snia.org (click on Resource Center)
www.computerworld.com/q?a1090

ALLEN CRAWFORD FLANNION ART CO.

# Oops!

## The 12 most costly storage mistakes — and how to avoid them. By Sami Lais

IT MANAGERS implementing big data storage today are playing a game of high-stakes poker, and the odds are stacked against them.

"We see it all the time — people implemeoting SANs for all the wrong reasons or implementing a SAN when what they really need is [network-attached storage]," says storage consultant Mark Roberts.

Most mistakes and overspeoding on storage can he avoided if storage managers first look within their own enterprise — at the data, the infrastructure, the people and processes and, most important, the business, Roberts says.

For six years, Roberts has helped design and build storage-area network (SAN) architectures for dozens of Fortune 500 companies. He worked formerly at storage consultancy Trilliant Group in Cincinnati and now works at Dataphile Consulting in Austin, Texas.

SPECIAL REPORT STORAGE

*Computerworld* asked Roberts what are the biggest, costliest storage mistakes that enterprises make and how managers can avoid them.

**1. IT managers haven't clearly defined the business requirements.** "They look at the technology requiremeots, not the business requirements," Roberts says. "Wheo people talk about needing shared storage or SANs, that begs the question. The questioo should he, What are you trying to do? What business goals are you trying to achieve with shared storage?"

For many enterprises today, that answer might be, "We're moving our operations from a local to a global focus, and we need our storage to expand to handle it," he says.

**2. They get bogged down in the technology.** "Say you're moving the application to 24/7 availability, and you need that 99.999% systems availability," Roberts says. The same infrastructure, staff and processes that must support the new applicatioo requiremeots must also support an ongoing initiative, such as migrating from Windows NT to 2000. Add to that the increased load of Oracle and Microsoft SQL databases supporting the application.

Those databases also support systems from Siebel Systems Inc., so the effects may not so much ripple as rip through an organization, Roberts says. "And here we are with the technology requiremeots and not the business driver — see how easy it is?" he asks.

**3. They don't know enough about their existing storage.** "Most people can't tell you what their disk utilizatioo is today," Roberts says. "And if they could, they'd he wrong. . . . One very large company we worked with started counting its storage. They couldn't eveo count it all — they stopped at 110TB. Then we looked at their disk utilization, and it was about 20%."

The company said the 20% figure couldn't possibly be right but couldn't say why it was wrong, either.

"People helieve they have an idea of their disk utilization, and it's always wrong," Roberts says. "They always think it's higher than it is.

"We find that at most companies, overall disk utilizatioo is 40% or less," he says.

*Continued on page 46*

**If what you have in mind is unlimited scalability with continuous access to data, then Brocade has your solution.** It's called a Storage Area Network (SAN). The enormous growth of business information along with the need for anytime, anywhere data access requires a new approach to data storage. *A networked approach.* A Brocade-based SAN enables your company to seamlessly add storage on demand to meet your ever growing data storage needs. Brocade SAN infrastructure solutions are available from leading system OEMs and integrators worldwide.

BROCADE

The intelligent platform for networking storage

©2001 by Brocade Communications Systems, Inc. All Rights Reserved

# Oops!

Continued from page 44

**4. IT managers don't consider the network.** "Virtually all backup packages are network-centric, so the capability of the network to assume new data loads should be considered," Roberts says.

The heavier stream of data from a new storage initiative can slow a network to a crawl.

"Restore problems are common," he says. "We saw one company where it was taking 12 hours to restore one volume, but because of the added load on the network, they kept getting timeouts and having to start over. It took them three days to finally do it."

**5. They don't know their data.** Not just what kind of data, but also the age of the data, how long it must be retained, how often it changes and how it's being used are important, Roberts says. Managers often don't know what applications are using the data, so they can't define their storage requirements, he says.

**6. They don't consider the entire data life cycle.** "I hear people planning their storage architecture, and they're planning only for online storage; they haven't thought about anything else," Roberts says.

"Anything else" can include backup, archiving, online data retention, data replication and off-site storage for disaster recovery.

Archiving, like disaster-recovery planning, requires storage of not only data but also, depending on the age of the data, versions of the software that use it, including all patches, upgrades and customizations.

Evaluate storage requirements throughout the data life cycle and on an application-by-application basis, Roberts says.

**7. They can't justify backup requirements.** "Too many companies fall back on a standard grandfather-father-son routine for backup," Roberts says. In such a routine, you might back up NT servers every day for a month, once a month for a year and once a year thereafter.

IT managers often institute such routines, regardless of the application involved, for reasons no better than "because they did it that way on their last job," Roberts says, adding, "You can't tell me that a 30-day backup cycle for every NT server is a good idea."

**8. They don't know the limitations of storage software.** "SAN management software is not well-developed enough to automatically do everything people need it to do," Roberts says.

"Take configuration software for the fabric switches and other components," he says. "You make a change and implement it, and it can have a vast effect, sometimes for the worse, and there's no backout scheme.

"SAN components are getting to be pretty stable, but SAN management software needs to catch up," he says. "As SANs grow, this is a limit they're hitting."

**9. They're unprepared to become integrators.** The move to new storage topologies is very like the move 15 or 20 years ago to distributed systems in that "the role of systems integrator is switching back to customers," Roberts says.

A shared storage system that brings together Novell NetWare and IBM's MVS systems can run into major interoperability problems, he says. Even between NT and NetWare, the physical block size of their data is different and may call for a different disk array than what's planned. The new disk array may deliver less performance or storage capacity, Roberts says.

"In the rush to implement SANs, managers have taken on the role of integrator, and they're paying a high price," he explains.

**10. They don't make shared storage a team effort.** "Once you go to shared storage, it's not hardware and software that are the big problem, it's processes," Roberts says.

Shared storage typically involves multiple groups and a shifting of functions, such as from operations to administration.

"For some people, separation anxiety sets in when storage moves out of their direct control," he says.

The storage manager should lead the team investigating storage options, but representatives of all major stakeholder groups, including business, applications, administration and operations, should be included, he says.

**11. They don't pay enough attention to administration requirements.** Planning must include asking, "Are existing staff technically capable of managing a SAN? Is their current level of education adequate?" Roberts says.

"A good example is an operations group that now only administers and operates disks for NT," he says. "With a move to shared storage, they'll have to administer disks for NT and Solaris. The disk subsystems configuration and administration for the two are very different. You're going to have to consider training costs."

**12. They don't know where they're trying to get their return on investment.** Too often, the assumption is that implementing shared storage will automatically generate savings that will create an adequate ROI, Roberts says.

That's not good enough, he says. At the end of the planning process, managers should know not only what the requirements for shared storage are, but also where the ROI will come from and how long it will take to generate.

"If they can't do that," he says, "they need to go back and re-examine the business requirements, and they need to accomplish that as their first step."

## Negotiating With Storage Vendors

*Even if your planning has been impeccable, negotiating with storage vendors to build your new shared storage system can be difficult. Mark Roberts, head of storage consultancy Dataphile Consulting, offers the following tips:*

**Insist on a request-for-proposals (RFP) process to ensure that the vendor can meet your needs.** If you don't have the expertise to write a rigorous RFP, hire a professional – "a paid skeptic" – who can.

**Stick with mainstream disk vendors.** "These are the people who are going to be able to support you if your road map changes," says Roberts.

**Establish a partnership with your vendor.** "Get your partner to commit to meeting your goals, not just supplying technology," he says.

**Make your disk vendor responsible for selecting your SAN components.** "Not all switches, host bus adapters and other components are interoperable," Roberts says. "The vendor will have its own certification processes to ensure interoperability."

**Get your vendor to show how the proposed hardware and software performance meets your goals.** For example, new disk purchases will almost certainly have larger individual disk capacity than your old disk technology, but you may be able to use only a fraction of the new disk capacity.

**Ask your vendor for a road map of where each product is going.** Check to be sure the proposed road maps meet the requirements of your business.

**ONLINE EXCLUSIVE**

■ Storage consultants from EMC Corp. say it's important to find out the business requirements from stakeholders before making technology decisions. Read the interview at: **www.computerworld.com/q?123873**

While all of our competitors were studying history,

INRANGE was making it

1975

RANGE

INRANGE

# What's After Fibre Chann

## Already a handful of alternatives for storage connectivity are appearing. Each one has pros and cons.

By Lucas Mearian and Mark Hall

JAMES NARDI oversees hundreds of terabytes of data. Sometimes, the disks that it all resides on get hammered more than 10,000 times a second. Sometimes, they get requests only once in a blue moon.

"We can't ose just one disk technology and satisfy all our storage needs," says Nardi, director of Web hosting special operations at Edgewood, Colo.-based Verio Inc., one of the world's largest Internet hosting providers.

So Verio has a significant investment in Fibre Channel technology, which delivers excellent results for demanding storage needs. But the company, like so many others, is constantly looking beyond Fibre Channel for future storage solutions. Some of the leading contenders to displace Fibre Channel are iSCSI, Fibre Channel over IP (FCIP), Internet Fibre Channel and, in the near future, InfiniBand.

Verio is looking at all of them. It has full-time technology evaluators in Virginia and Colorado who are dedicated to checking out the latest in advanced storage and other systems.

"We're pretty aggressive about embracing new technology, especially for our large and medium enterprise customers," Nardi says.

The company uses Fibre Channel-based storage-area oetworks (SAN) and Gigabit Ethernet-switched disk drives, and it's even exploring iSCSI to stay ahead of the technology curve.

But a specific technology is never the most important issue, Nardi explains. "Users don't pay for a particular disk configuration," he says. "They pay for capacity, reliability and performance."

The University of Utah in Salt Lake City doesn't have paying customers with penalty-laden service-level agreements, so it can push the envelop a bit further than even technology-rich service providers. It's currently piloting eight SCSI-based storage systems that send block-level data over Ethernet using IP — an approach known as iSCSI.

"It's up to your imagination to come up with creative ways to play with this," says Brian Haymore, the school's senior systems engineer. "Most people already run Ethernet and SCSI, so all you're doing is combining those two pieces together."

The university's iSCSI boxes, which were developed by 3ware Inc. in Mountain View, Calif., each have 650GB of capacity and data transfer rates of about 65MB per second, while comparable Fibre Channel boxes offer gigabit speeds, Haymore says. The iSCSI box, called Palisade, lists for $24,000.

Haymore says the only significant problem he's encountered in using Ethernet as a data storage subnetwork is the latency, about 75 microseconds due to the TCP/IP stack. "If you're digging through thousands of files, that becomes pretty severe," he says.

Haymore considered a Fibre Channel SAN, but he says it was too expensive and he had concerns about its reliability.

He protects the data going over the school's IP network by masking the switched network from the rest of the school's intranet. But Haymore understands there could be security issues with that approach.

"No one knows what the security risks of having iSCSI traffic exposed to anyone else will be yet," he says.

Brian Berg, principal of Berg Software Design in Saratoga, Calif., says iSCSI poses major security problems right now. "You're dropping your drawers unless you have encryptioo using iSCSI today," he says. "Without an engine to off-load the TCP/IP protocols, performance will suffer with iSCSI." He also claims that iSCSI is inherently less reliable than SCSI or Fibre Channel, too.

Even with those drawbacks, iSCSI remains attractive because it takes standard SCSI data and commands, wraps them in TCP/IP packets and whisks

JAMES NARDI says Verio has a big investment in Fibre Channel storage technology but nevertheless is aggressively investigating replacement technologies.

el?

them across the Internet, thus breaking SCSI's 50-meter distance barrier for backup and recovery while still using a common communications protocol.

In addition, most IT professionals are familiar with Ethernet networking, and iSCSI appliances are "plug and play," meaning they can simply be connected to an existing intranet. Additionally, TCP/IP will automatically load-share where multiple connections exist, it retries when it fails to make a connection, and it provides automatic fail-over capabilities. The Internet Engineering Task Force is currently reviewing the proposed storage over IP standards and is expected to finalize them by the end of this year.

But Fibre Channel devotees aren't standing by idly. FCIP is another tunneling technology that lets islands of Fibre Channel SANs interconnet over IP-based networks. This forms a single, unified Fibre Channel SAN fabric for backup or mirroring or to create a more extended Fibre Channel storage network.

FCIP uses a device, such as a switch or router, to wrap Fibre Channel data frames into TCP byte streams or packets. Once the data reaches its target, the TCP frames are stripped off and you again have a Fibre Channel data frame for storage or access.

Another Fibre Channel-based approach is the proposed Internet Fibre Channel Protocol (iFCP). IFCP is designed to interconnect existing Fibre Channel SANs by associating an IP address with Fibre Channel end devices. Every Fibre Channel device in an iFCP network has a unique address that is used to locate the target for the data.

"That is very useful for diagnostics and tracking conversations across a network," says John Webster, a storage analyst at Illuminata Inc. in Nashua, N.H.

Analysts believe iSCSI, iFCP and FCIP will all hit the market, "but that doesn't mean they'll be a commercial success," says Arun Taneja, an analyst at market research firm The Enterprise Storage Group Inc. in Milford, Mass.

Mike Anderson, vice president of information services at The Home Depot Inc. in Atlanta, says he wants to see market adoption and maturity in a product line before he'll buy it.

Anderson helps manage 60TB of data on a centralized architecture. He says there's promise in using a local IP network for real-time data replication for purposes of backup and disaster recovery. "We don't have a redundant data center that does real-time backup right now," he says.

He adds that there's an advantage in networking with IP because of its maturity and standardization.

"The things we think about when managing disks are: Can we share it among multiple operating systems? IP works across all operating systems," says Anderson, whose centralized data center in Atlanta runs on OS/390, Unix, Windows NT and Novell.

## So Long, Fibre Channel

In less than seven years, IP storage will dominate over Fibre Channel SANs because of simplicity, the desire for single networks and the technical skills available in the marketplace, says Bob Zimmerman, an analyst at Giga Information Group Inc. in Cambridge, Mass.

But the ability to build an iSCSI-based SAN comparable to today's Fibre Channel SANs won't be a reality until late next year or early 2003, analysts say. For that reason, hybrid tunneling and translation technologies like FCIP and iFCP, which connect Fibre Channel to IP networks, are expected to be around for some time.

Depending on which industry research firm you ask, 3% to 10% of the world's enterprise-class storage is on a Fibre Channel SAN. Because Fibre Channel technology is quickly maturing, along with the tools to manage it, the market share for Fibre Channel networks is expected to grow to 25% within the next two years.

Then there are those who believe that InfiniBand will eclipse Fibre Channel and all of its other supposed replacements. InfiniBand was designed as a replacement for the PCI bus inside servers and PCs in a cooperative effort by Intel Corp., Sun Microsystems Inc., Hewlett-Packard Co. and other industry giants.

Although barely off the drawing board and celebrating just its first year as a specification this month, InfiniBand has generated enormous enthusiasm because it not only replaces an internal bus with an external fabric network, but also can put storage on the same level as cache memory. That leaves all other protocols in the dust in terms of performance.

Still, InfiniBand is years away from being a true alternative to Fibre Channel. Even a backer of the technology, Eyal Waldman, CEO of InfiniBand chip maker Mellanox Technologies Ltd. with headquarters in Santa Clara, Calif., and Yokneam, Israel, says not to expect InfiniBand-equipped servers and storage devices "in the millions" until sometime in 2004.

But when they do get here, Waldman says, you can forget about iSCSI and other Fibre Channel replacements. "They can't scale or give the same price-performance of InfiniBand," he says.

## Future Contenders

*These technologies could eclipse Fibre Channel for storage connectivity in the next few years:*

**iSCSI:** Under this draft specification from Cisco Systems Inc. and IBM, SCSI codes are generated from user requests and the data is encapsulated into IP packets for transmission over an Ethernet connection. It overcomes SCSI's latency problem and 50-meter distance barrier but may have security risks.

**Fibre Channel over IP (FCIP):** Developed by the Internet Engineering Task Force, FCIP enables the transmission of Fibre Channel information by tunneling data between SANs over IP networks. It's especially suited for data sharing over a geographically distributed enterprise.

**Internet Fibre Channel Protocol (iFCP):** This hybrid technology is a version of FCIP that moves Fibre Channel data over IP networks using the iSCSI protocols. It's designed to interconnect existing Fibre Channel SANs.

Quick Link

**ONLINE EXCLUSIVES**

- The emerging technology InfiniBand is likely to displace a lot of the computer interconnect infrastructure, such as SCSI and Fibre Channel, when it begins to hit the market in volume in late 2003: www.computerworld.com/q?723703
- New products with alternatives to Fibre Channel are emerging on the market even now. But options are few and costs are high: www.computerworld.com/q?723705

STORAGE

# For biotech information companies, a staggering amount of storage is just part of doing business. By Kevin Fogarty

# Tons of DNA Data

Some companies keep databases that contain all the personal information they can get about certain people. Other companies keep databases with all the data there is about all people — all the data available about the DNA that makes those people who they are, anyway.

DoubleTwist Inc. in Oakland, Calif., and Celera Genomics Corp. in Rockville, Md., are among several companies building biotechnology businesses based on the recently mapped human genome. Both companies collect and disseminate information about the genome to pharmaceutical and biotech companies, researchers and others trying to use maps of the human genome to design new drugs and other medical treatments.

To do that, however, both companies have to maintain enormous databases and update huge amounts of data as researchers add more detail to the still-sketchy guides to human DNA. That requires massive resources to store and annotate the data with research information to make it as useful as possible.

"Really, they're like the companies that do oil-reservoir mapping using 2-D and 3-D soundings of reservoirs, then applying algorithms to analyze those," says Nick Allen, a storage analyst at Stamford, Conn.-based Gartner Inc. "They're both data-intensive operations, but [the oil companies] are churning that data every decade, not every day the way the biotechs are."

About twice per month, for example, DoubleTwist takes in approximately 10GB of fresh data on the human genome from the National Institutes of Health in Bethesda, Md., and various research labs worldwide. DoubleTwist analyzes that data and then adds notes describing the likely functions of some gene sequences and the relationships between specific genes and the proteins or enzymes they control.

The resulting data set and the research-and-development databases spun off from it take up so much space that "we've kind of given up on stringent controls on storage," says Edward Kiruluta, chief technology officer at DoubleTwist.

"Storage is one thing we actually try to budget for, though we always go over. But I find a lot of our most problematic storage needs are temporary," he says. "Say five people want to do some mining of a data set; the result can be five times the original data set. But we might only have to hold on to those results for three months, then we can delete it."

## Celera Genomics

**Business:** Maps genomic data and sells and supports research based on that data.

**Goals:** To map the human genome within three years and to use that information commercially, beating the National Institutes of Health's 15-year mapping plan, which was due for completion in 2005. Both goals were reached last year.

**CEO:** Tony L. White

**Employees:** 684

**Fiscal 2001 sales:** $1.6 billion

SOURCE: MEDIA GENERAL INC., RICHMOND, VA.

## DoubleTwist

**Business:** Uses publicly available genomic data to create annotated research databases.

**Goal:** To collect, analyze and annotate genomic data, provide genomic databases and provide analyst tools to help pharmaceutical scientists develop new medical treatments.

**CEO:** John Couch

**Employees:** 130

**Fiscal 2001 sales:** $2.8 million

SOURCE: DUN AND BRADSTREET INC., MURRAY HILL, N.J.

That kind of data economy helps, but it doesn't do much to rein in the company's need for storage, Kiruluta says. It's not that the kind of high-end disk storage the company relies on for most of its data is cheap; the StorEdge arrays from Sun Microsystems Inc. that DoubleTwist uses are high-end enough to cost nearly as much as the machines they support, Kiruluta says. "If the machine costs a million, pretty much the storage that goes along with that will cost close to that as well," he says.

Gartner's figures indicate that more than 50% of the cost of high-end machines — and sometimes as much as 80% — goes to storage.

What makes that kind of spending worthwhile is that those huge databases have to be available quickly or the amount of advanced analytics and research won't be substantial enough to make the company's information valuable to customers, according to John Reynders, vice president of information systems at Celera Genomics.

Celera was the leading commercial entity in the race to map the human genome. To support its own research, Celera maintains about a teraflop of computing power and 100TB of spinning disk space, as well as several "islands" on a storage-area network, which totals two to three times the amount of data that even large companies like RadioShack Corp. or Lockheed Martin Corp. have to support.

Quick Link

**ONLINE EXCLUSIVE**

■ For a look at the high-powered server setup at bioinformatics firm Celera Genomics, visit: www.computerworld.com/q723684

DoubleTwist has only about 10TB of capacity but structures it in an innovative way. Rather than maintaining the central data in a relational database, the company keeps its main data store in an XML-based database that lets it more easily create links between data sets, redefine those links and translate the data into other formats, Kiruluta says.

One format is for a set of Oracle Corp. databases, and another is for the company's proprietary data-analysis tools, which are installed at some customer sites. Another is a flat text file that's used by the company's online customers for queries that are too varied to easily define.

"Relational databases are useful in the production system because you can put in schema that let you do high volumes of direct, specific queries," Kiruluta says. "But a database like ours is going to have thousands of tables in it. To do a reasonable query on that data is going to require a lot of knowledge about the schema and that data.

"Biology does not have the luxury of a restrained vocabulary," he adds. "Talk to 10 scientists, and they'll have 10 names for the same thing. A text-search interface is actually a very good fit for that sort of thing."

Sometimes, apparently, even the most sophisticated data set surrenders to the simplest kind of questions. ▶

*Fogarty is a freelance writer in Sudbury, Mass.*

drives your *data*.
VERITAS. The software that *fuels* storage.
VERITAS

# The Hunt for Storage Skills

## Systems and network administrators take up the slack. By Kim S. Nash

LIKE MANY OTHER IT workers, Jesse Gilleland was laid off this summer. But unlike lots of other IT professionals, he landed a new job in less than three weeks.

Gilleland credits his three years of enterprise-level storage experience for the quick resolution. He's now a senior systems engineer at Communications Technology Systems Inc., an IT services firm in Roswell, Ga., where he recently configured several storage pools on various types of EMC Corp. hardware that can be used in a Web server farm or disaster recovery system.

"There are very few people who are storagecentric," he says. "It's a good niche market to be in."

STORAGE

Indeed, three years' experience is more than most candidates have, according to Arun Taneja, an analyst at The Enterprise Storage Group Inc. in Milford, Mass. A lack of widely accepted, vendor-neutral training and the fact that storage technology is advancing so quickly means that people with "quality storage skills are scarce," Taneja says.

As a result, companies are unable to fill storage administrator positions and are often forced to make storage just one aspect of a systems or network administrator's job, he says.

But that's changing. Not only are companies continually taking in data from e-commerce sites, but massive IT projects in enterprise resource planning and customer relationship management also require and generate large amounts of data to be useful. Someone must manage the accompanying data storage, Taneja says, adding, "You can't run away from it."

Of the 47,000 open jobs listed at online job board Dice.com, 1,500 request storage skills and 900 of those call for storage management knowledge, says a spokeswoman at Dice Inc. in New York.

Tracy Reed says his experience as a Unix systems administrator makes him well prepared to handle the heavy-duty storage needs of his company, MP3.com Inc. in San Diego. An online music site, MP3.com has 70 to 80TB of data to store and move as Internet visitors download songs.

JESSE GILLELAND [illegible]

MANUEL LO PARANELLI

"A big part of managing large disk arrays is managing the allocation of the storage and managing the hardware, then choosing the right way to lay out how the data is stored for your application to get good performance," Reed explains. "These are things a Unix systems administrator will have been familiar with."

Reed says he does most of his work on equipment from Storage Technology Corp. in Louisville, Colo.

Knowing about storage makes him more marketable, Reed says. "I've not been scouting around, but I do get a lot of headhunters calling me up," he says.

To get around the lack of qualified professionals, Mike Donohue Jr., vice president of IT at Techies.com Inc., an online recruiting firm in Bloomington, Minn., has contracted with his vendor, Hopkinton, Mass.-based EMC, to provide all service on his site's storage-area network (SAN) gear. He says he hasn't even tried to find staffers with extensive storage backgrounds.

"The storage vendors are going to be very efficient," he explains. "They will make sure that they have the proper levels of expertise, but IT will have only a limited number of people inside who know this [technology]."

Another way to deal with the shortage is to cultivate the needed skills from within. It's generally less expensive to train existing staff than to find and hire someone from the outside, says Barb Gomolski, an analyst at Gartner Inc. in Stamford, Conn.

"People with distributed computing experience, networking and data management experience would be the natural candidates" to take on storage administration, Gomolski says.

What can IT professionals themselves do to develop storage expertise?

The storage market lacks widely recognized, general-purpose certifications. But many suppliers, including Dell Computer Corp., Hewlett-Packard Co., IBM, Legato Systems Inc., Sun Microsystems Inc. and Veritas Software Corp., offer their own classes.

To help learn Fibre Channel technology, which is at the heart of the hot SAN products, Taneja suggests solid training on switches from either Broomfield, Colo.-based McData Corp. or San Jose-based Brocade Communications Systems Inc.

Indeed, that reflects much of the path Gilleland has taken. He has training from HP and Sun and has done systems engineering work at storage vendors EMC and Anaheim, Calif.-based MTI Technology Corp.

"All I've got is real-world experience," he says.

And that's more than most. ▶

### Storage Salaries

*IT positions that usually encompass storage management duties:*

| | | [illegible] |
|---|---|---|
| Network design | $79,000 | 14.8% |
| Network engineer | $64,000 | 5.8% |
| Network manager | $59,000 | 14.7% |
| Systems administrator | $63,000 | 5.3% |

* As of June 2000; ** June 2000 to June 2001

SOURCE: DICE INC., NEW YORK

Quick Links

**ONLINE EXCLUSIVE**

■ Victor Janulaitis, CEO of IT management consulting firm Janco Associates Inc., offers advice for finding the right storage professionals:

www.computerworld.com/q?23580

IBM

***THEY CAME LOOKING FOR THE SOFTWARE CHOSEN BY LEADING E-BUSINESSES. THEY FOUND:***

# WEBSPHERE® AT eBay™

**IBM WebSphere is the fastest-growing e-business software platform:** eBay, one of the most successful "born on the Web" companies, has turned to WebSphere infrastructure software as it gets even more serious about e-business. WebSphere has the scalability to build, launch and maintain a massive around-the-clock site like eBay. Over thirty million registered eBay users will rely on the dependability of WebSphere when they buy collectibles, electronics and B-to-B services. Visit **ibm.com**/websphere/ebay

e business software

**IT'S A DIFFERENT KIND OF WORLD.**
**YOU NEED A DIFFERENT KIND OF SOFTWARE.**

MANFILLO PRANELLI

# One Tough Business

## The dot-com demise changes the storage service provider market. Will managed storage make it? By Steve Ulfelder

THE ONCE-PROMISING storage service provider (SSP) market has fallen on hard times.

SSPs initially thrived by handling the storage needs of businesses — often, dot-coms that had no interest in building a storage infrastructure, oot to meotioo developing a staff to run it. Wheo the dot-com bubble burst, SSPs, which tend to be young companies run on venture capital, shifted their business models and turned their focus to large enterprises.

But big companies aren't osing off-site storage either, says Adam Couture, an analyst at Gartner Ioc. in Stamford, Conn.

"There's still a bias in large eoterprises to keep primary storage in-house," says John Clavin, executive vice president of sales and marketing at Waltham, Mass.-based StorageNetworks Inc., a leading SSP. IT managers simply aren't comfortable shipping critical corporate data over a network to a third party, analysts say — especially to a start-up wbose future is by no means assured.

Moreover, analysts add, corporations tend to have extensive storage facilities that are not only run well, but are also deep into the depreciation curve; writing off such a massive investment makes no sense for many companies.

In addition, storage costs are so low (and still falling) that there's no budgetary reason not to own disk capacity. "The cost of round, brown memory keeps dropping," says Dan Tanner, a senior analyst at Boston-based Aberdeeo Group Inc.

### Enter Managed Storage

Hence, we're witnessing the birth of the managed storage provider (MSP) industry, wherein an SSP manages an enterprise's data storage on the customer's premises. Young SSPs such as StorageNetworks and Broomfield, Colo.-based ManagedStorage International Inc., as well as big-name vendors like Hewlett-Packard Co., IBM and Compaq Computer Corp., have established storage-manageoeot programs.

But in such a young market, how do you decide if managed storage is right for your business?

By outsourcing the management of its storage, a business leverages the value of its existing infrastructure; keeps priceless data under its own roof; benefits from an enormous gain in storage efficiency, which can translate into lower capital expenditure; and eliminates the need to hire expensive specialists to create and manage network-attached storage (NAS) and storage-area oetworks (SAN).

But eveo with those benefits, managed storage may still be a hard sell.

"We've got 1,100 stores, and they all need local backup," says George Ellison, an engineering manager at Ventura, Calif.-based Kinko's Inc.

If you've got the expertise and infrastructure but your storage environment is sprawling, heterogeneous and growing more complex, it may be wise to license a product and do it yourself.

Kinko's considered managed storage but instead chose software from Mountain View, Calif.-based Legato Systems Inc. Ellisoo says the company was leery about outsourcing storage management for the Windows NT servers at each of its retail branches.

"We have a mixture of NT, Novell and Unix systems, and four separate clients in the field, and we were more

*Continued on page 56*

***THEY CAME HERE FROM A PARALLEL UNIVERSE. THEY NEEDED SOFTWARE...TO GO!***

# LOTUS *FOR* WIRELESS

**Log Entry, Day 25:** Eureka! We have found Lotus wireless software. With it, mobile knowledge workers can access corporate applications via PDA, cell phone or other wireless devices. This lets them update critical work in real time – quite advanced. A most informative whitepaper can be found at **lotus.com**/visitwireless

e business software

**IT'S A DIFFERENT KIND OF WORLD.**
**YOU NEED A DIFFERENT KIND OF SOFTWARE.**

# One Tough Business

*Continued from page 54*

comfortable doing it ourselves with Legato," he says.

But vendors remain hopeful and are conjuring visions of dramatic results. Large enterprises with direct-attached storage typically use only 40% to 50% of their storage capacity "because they create these huge buffers, just in case," says Renie Craft, IBM's director of managed storage services. She claims that in some cases, IBM has driven that utilization rate as high as 89% by introducing a SAN and managing storage more efficiently.

## Data Stays at Home

Storage management engagements begin with an assessment of the customer's infrastructure, along with a discussion of its business strategy and anticipated future storage needs.

Under managed storage plans from vendors such as StorageNetworks and Southboro, Mass.-based Storability Inc., the customer's data resides on its own storage infrastructure — often a jumble of products from multiple vendors, direct-attached storage, SANs and NAS.

The storage management vendor installs on customer premises a physical device: a black box that serves as the vendor's primary access device. Storability calls this device its AssuredStorage Communications and Operations Module; StorageNetworks' device is dubbed S-POP Manager.

Compaq's model is slightly different. For each customer, the company creates what it calls a Private Storage Utility; the customer then pays for only the storage it uses. "If they use 10TB one week and 20TB the next week, that's what they pay for," says Richard Avis, vice president of storage networking solutions at Compaq's Enterprise Storage Group.

The vendor's hardware device resides on the customer's premises, within the SAN, and thus doesn't connect to an enterprise server. The hardware device serves the following two functions:

- It lets the provider see what's going on in the enterprise's storage system by compiling and repackaging in-depth information about capacity, performance, availability, uptime and trending — even from heterogeneous storage environments.

This information is relayed through a browser-based interface to the provider's remote operations center. It's also available to the customer's IT staff to view, but not to control.

- The device allows the provider to manage the customer's storage, performing functions such as provisioning capacity, allocating capacity to various hosts, executing a backup schedule, performing those backups (both scheduled and on demand) and replicating storage remotely across different data centers.

MSPs are well aware that security is IT managers' No. 1 objection to storage outsourcing. "When you outsource, you're putting your crown jewels in the hands of a third party," says Tanner.

Vendors take extensive measures to ease IT managers' worries. First, the actual network link between the enterprise and the provider is dictated by the customer; it may be via a virtual private network or a frame-relay connection. Storage providers also stress that under the managed-storage model, actual customer data doesn't flow from the customer to the provider. Rather, what the vendor sees is metadata — information about the information.

In another security measure, that metadata is then encrypted. Some providers, including Storability, are audited by a third party to assure customers that their security and encryption measures are up to snuff.

## Taking the Leap

The managed-storage market is young, but some large businesses have taken the plunge. Merrill Lynch & Co. has contracted with StorageNetworks to first build, then manage, its SAN. Chris Corrado, chief technology officer at the New York-based financial services firm, recently told *Computerworld* that by outsourcing, he expects to save 20% on the SAN's total cost of ownership [News, Aug. 20].

But many IT organizations, wary of SSPs in general, are hesitant. Large enterprises tend to have significant experience and talent in the storage area. Even Compaq's Avis acknowledges that "some of these enterprise customers really are better at managing data than the [storage management] centers."

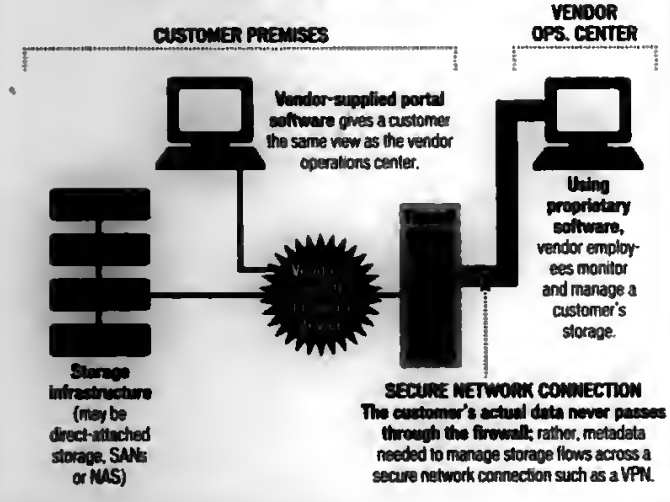
Several MSPs, such as Storability, offer the option of licensing their software. StorageNetworks doesn't do so now, but the company has said that it might in the future.

Darren Mace, IT director at HomePortfolio.com, says he has mixed feelings about outsourcing storage. In May, the Newton, Mass.-based home-design company selected Storability's AssuredRestore service for data backup. But Mace decided not to have the MSP manage HomePortfolio's primary storage needs. "We don't want to add that layer of bureaucracy and complexity," he says.

At one level, the business case for managed storage — cost savings and fewer hiring headaches — is appealing. But then, so was the case for SSPs, and large enterprises have roundly rejected that model. Vendors face the burden of convincing IT managers that managed storage is right for them. ◗

*Ulfelder is a freelance writer in Southboro, Mass. Contact him at sulfelder@charter.net.*

## How Managed Storage Works




**Quick Link**

**ONLINE EXCLUSIVE**

- Storage consultants from EMC Corp. say it's important to find out the business requirements from stakeholders before making technology decisions. Read the interview at:

**www.computerworld.com/q?23673**

## When Does Managed Storage Make Sense?

*There are few role models in the nascent managed-storage market, but analysts, vendors and users agree that you may be a candidate for the service if:*

1

**You have an extensive storage infrastructure but struggle to remain fully staffed; SAN and NAS experts are hard to come by.**

2

**You're feeling pressure to keep capital expenditures down. Managed storage can forestall hardware purchases by more efficiently using existing equipment.**

3

**You like the idea of outsourcing wherever it makes sense, but you're unwilling to park your data under somebody else's roof.**

POWER-UP CRASH
FORMAT CONNECT BACK-UP
SHUT DOWN MOVE
PULL PLUG

click.

Add storage and content without adding more racks. With help from DataCore. Our SANsymphony™ software virtualizes storage, creating shared pools from any networked assets. So you can use storage from one server to alleviate the growing pains of another. For more on virtualization, read our free white paper at www.datacore.com/click. After all, the best way to solve your storage problem is to keep it from ever becoming one

DataCore
SOFTWARE

© 2001 DataCore Software Corporation.

# Managing the I

## IT managers are finally teaming up with records managers to figure out what to keep and for how long. By Kevin Fogarty

KNOWLEDGE MAY BE power, but it can also be like an unwanted houseguest, cluttering up your neatly designed data structures, gobbling up resources and slowing down every search — without ever being valuable enough to justify the coddling it requires.

Knowledge, or information at least, can be as much a liability as an asset when it's handled as haphazardly as it is by most U.S. companies. They collect every bit of data that seems attractive and then hang on to the resulting information mass forever for fear of deleting something that might eventually be important. That's one reason why IT staffs at large corporations are increasingly teaming up with records management specialists, who are experts in when to keep information and when to purge it.

Until recently, the main responsibility for such specialists was the storage and management of paper records. "It's just in the last year or so that I've seen the records management folks and IT team up," says Nick Allen, a storage technology analyst at Gartner Inc. in Stamford, Conn.

"They're bringing records management discipline to electronic objects. They're saying it's their purview and they can help IT," Allen says. "And both [groups] are saying they have to do this or they're going to get killed."

Finally, records managers are moving out of the back rooms of legal and accounting departments. "We're trying to extend the discipline of records management to the rest of the company," says Cheryl Pederson, corporate records policy manager at Cargill Inc. in Minneapolis.

Pederson, who has spent most of her 29 years at Cargill managing, indexing and storing legal documents, is now taking the same approach with Word documents, Excel spreadsheets and customer databases, as well as with other corporate information.

### Undisciplined Storage

There has oever really been any discipline regarding how — or how long — electronic records should be collected or stored, no matter how important they might be, says H. Larry Eiring, senior manager of records and information management at law firm Covington & Burling in Washington, which has about 350 lawyers, eacb a source of paper and electronic information.

"There's a strategic need to manage that information," says Eiring. "Companies are realizing they have to be able to store, manage, make some sense of data and make it accessible to users so they can make decisions and offer advice to clients faster and more easily. That's the crux of why electronic records management is coming into its own."

"It isn't enough anymore to manage your strategic information; you have to manage your information strategically," says Angela Fares, corporate records and information manager at RadioShack Corp. in Fort Worth, Texas. "Because the cost of collecting information is very high, if you can collect it once and use it many times, that reduces the cost of your informatioo management."

Each department at RadioShack used to make its own decisions about what information to store and how. Fares is currently leading a company-wide program to create an inventory of the information within the company, eliminate duplication of data and decide not only what to collect but also what to keep and in what medium.

One of Fares' goals is to eliminate 45% of the company's hard-copy records within the next two years. "I'd much rather be storing stereos in those warehouses than boxes of paper records that no one uses for years," Fares says.

The first step in the process of getting control of electronic records is to meet with business unit managers to find out what data they're storing, what data they need, what they need it for and for how long, Pederson says. Then get the records management and IT people together to talk about how the records are stored and to consider the best available technology.

Next, define a life cycle for records that states when and how they're collected, in what medium they're stored and when they should be deleted.

"We're marrying the infrastructure that IT has the lead on and the best practices that records management brings in," Eiring says. "Competitive companies have realized that they get a bigger bang for the buck if you put the two together."

But many companies are finding that no matter how much they'd like

ALLEN CRAWFORD/PLANET ART

to delete records, they can't.

RadioShack and many other companies must store data for much longer than they ever thought necessary to meet the demands of government audits, human resources departments, litigants and investors.

"We've always been a keep-everything company anyway," says Roo Cook, senior director of strategic architecture and technical operations at RadioShack. "We were hoping to get away from that, but we're finding out it's going to be extremely difficult."

During the past 12 to 18 months, the company's lawyers and accountants have found that having detailed sales tax data from each retail transaction makes conducting tax audits easier. In fact, the increased efficiency pays for the disk space required to keep a decade's worth of data.

## The Tax Man

That's not unusual, according to Karl Frieden, a partner at Chicago-based Andersen Worldwide. Most states audit major corporations every three years and look back at the previous three years' worth of data. "So any substantial company with a half a billion or a billion in revenue is going to face several dozen of these audits in various states every year," Frieden says.

"Historically, those records have been kept in paper files, which can be cumbersome and expensive," he says. In one case oo which Frieden worked, auditors requested 1.5 million files, which took more than a year to collect. "It's very expensive to defend some of these audits," he says.

Other companies face the same long-term requirement, not just for tax records, but also for records that describe how a long-term project came together, documentation of research that led to a patent, and other data that might be needed to defend the company in court, says Kim Sawyer, vice president of computing and network services at Lockheed Martin Enterprise Information Services in Orlando.

The IT department typically focuses on short-lived transactional records, while records management experts focus oo information that may last a lifetime, like a patent, a birth record or other important documentation, says Robert F. Williams, president of Chicago-based consultancy Cohasset Associates Inc. "The IT people understand the options that will provide the solution, but not the problem," he says.

Document management systems, for example, are great at handling electronic files that are in active use, but they often lack versioo control and have weak rules regarding how to handle the record, who can share it and how long it can be retained, Eiring says.

Records management applications, on the other hand, have just recently begun to handle electronic documents, but they can impose strong policies on the disposition of records, he says.

Eiring says the IT, records management and business units should work together to establish rules and practices that not only fit the needs of end users and regulatory agencies but also reduce costs and boost efficiency.

Allen, however, predicts that self-managing storage systems will start to appear in a few years.

The future may look like this: Information could be tagged with XML or other metadata spiders, which are automated software agents that gather metadata and maintain a metadata database. Then the agents could classify records according to a hierarchy set by corporate policy, while indexing the data, storing it io the cheapest practical medium and purging it when its useful life is up.

"Then you could spend more time managing the hierarchy and mining the data," Allen says. "And yes, you could he a pack rat, and it wouldn't cost so much to be a pack rat." ◗

*Fogarty is a freelance writer in Sudbury, Mass.*

**ONLINE EXCLUSIVE**

■ For advice about storing records that need to be kept for 10 years or more, visit the *Computerworld* Web site. **www.computerworld.com/q122777**

## A Primer on Records Management

*Goals of a records management program:*

- Control the creation and growth of records.
- Reduce operating costs.
- Improve efficiency and productivity.
- Support better decision-making by management.
- Ensure regulatory compliance.
- Minimize risk of litigation.
- Protect vital records.
- Assimilate new record-keeping or records management technologies.

SOURCE: ANGELA FARES, RADIOSHACK CORP., FORT WORTH, TEXAS

## Storage Time Frames

- Short-term storage: Two years or less, with frequent (daily) access.
- Medium-term storage: Two to 10 years; may be accessed weekly, monthly or quarterly; often required for tax purposes.
- Long-term storage: More than 10 years; access may be rare, but each record should have a defined retention period. This includes some records that must be kept for the life of a product, legal or patent documents, historical documents, documents of incorporation, corporate charters and long-term contracts.

SOURCE: GARTNER INC., STAMFORD, CONN.

## How to Know What You Have

- Create a records inventory sheet.
- Identify the person in each department who handles the most data.
- Coach that person in how to fill out a data inventory sheet.
- Take inventory of every database, every report and every piece of microfilm in your company.
- Ask departmental representatives what they need that isn't included in the data inventory.
- Ask departmental representatives what's in the data inventory that they don't need.
- Identify data in high-risk areas – data that might be audited for taxes or other reasons. Place high-risk data in the fastest available storage medium.
- Prioritize other data by its importance and the frequency with which it will be accessed.
- Decide on a medium for data based on its priority, such as disk for the highest priorities and paper for the lowest.

SOURCE: ANGELA FARES, RADIOSHACK

# Data Pack Rats

# Drowning In E-mail?

## Mailboxes are filling up with messages and their attachments. Now what? By Jennifer DiSabatino

IT'S A BACK-END BEHEMOTH. Jokes, pictures, work documents, presentations and video clips. Companies are storing gigabyte upon gigabyte of items they don't need, and they haven't organized those they do so the end user can get at them.

"A lot of companies that didn't manage their data retention by policy at the onset find it a lot more difficult to manage their policies from a cost perspective. There were no bounds on their mailboxes, and it just grows exponentially," says Carl Jones, director of desktop and e-mail product management at The Boeing Co. in Chicago.

"What we've found is people will manage right up to their limit," Jones says.

ALLEN CRAWFORD/PLANETON ART CO

STORAGE

Even before Boeing installed Microsoft Corp.'s Exchange messaging and collaboration software in 1996, the company had already begun to cut back on the storage allotted to employees for their e-mail. Boeing used the messaging software to implement a strict policy allowing messages to be backed up for only 14 days and limiting each user to 15MB of e-mail storage space.

Jones says making end users responsible for managing their own information is a long-standing policy at Boeing, in part because of the economic benefits: The less data stored, the less hardware the company has to buy. And, to make individual business units aware of their usage, they are billed for messaging services as if they were customers. The messaging services are part of each unit's operating budget.

The 15MB limit is a hard stop, Jones says. When a user approaches the limit, he's warned automatically. And when a user hits the wall, he can receive but no longer send messages, Jones says.

Users are expected to move necessary messages, documents and attachments to a file storage system. "The effect is that they delete mail that they don't need, and they store mail that they do need in another way," like in the file storage system or on the company intranet, Jones says.

"By policy, if it's something to be conducted for business, we ask that it be conducted on the Web," he adds. "How we access that information is through the search engine on the Web."

### Steps to Take

Accessing stored information is the other key component of managing messaging mailboxes. Purging e-mail isn't necessarily the right way to go about managing what is, in large part, a company's intellectual assets, says Robert Gray, an analyst at IDC in Framingham, Mass.

"It's a penny-wise and pound-foolish policy," he says. Instead, firms need to decide first how they will organize their data and, second, how will they handle their old, disorganized data in messaging systems.

"What are you doing when you're purging stuff? You should have software with metadata that lets you get at it," Gray says.

Existing knowledge management tools from the two major messaging and collaboration vendors, Microsoft and IBM subsidiary Lotus Software Group, can help, but they aren't yet widely used, analysts say.

Gray says using a search engine can get at messaging stores, mostly by tagging files with metadata so they can be searched not only by author, but also by content and subject.

When messaging and collaboration systems do attempt to organize data, however, they look at more than just e-mails. They look at all objects in, for example, Microsoft's Outlook/Exchange and Lotus Notes/Domino messaging systems, which contain address books, calendar and other information databases. Add unified messaging, with voice mail, fax, wireless pages and any other conceivable form of communication, and the communications database becomes much more unwieldy to maintain and to access.

"Unified messaging has failed in corporations. Part of the reason for this is that the systems that store voice mail are different from the systems that store e-mail. This results in poor integration from the user's standpoint," says David Ferris, president of Ferris Research in San Francisco.

Ferris analyst David Druker says Notes and Exchange don't add much to the size of an e-mail file, but because they are relatively complex messaging systems, they "take lots of server CPU [cycles] to service users and manage their message stores." ▶

### A Policy Vacuum

When it comes to e-mail, most companies turn a blind eye to the teetering stacks of messages their workers accumulate over weeks, months and even years.

A recent survey of corporations and their e-mail retention policies by Ferris Research in San Francisco revealed that users store huge volumes of data and that companies are soft on even the most egregious digital pack rats.

"Most companies still have no quotas and probably only crack down on staff when they have huge mailboxes of several hundred megabytes or more," says Ferris analyst David Druker, although he notes that e-mail retention policies vary widely from company to company.

Boeing, which allows workers limited storage space for e-mail, is an exception, he says. But like Boeing, most companies let users manage their own e-mail storage, deciding whether to delete messages or save them as files, Druker says.

But the attitude toward e-mail storage appears to be changing. "Several respondents [said they were] interested in technology like e-mail archiving systems to help them centrally manage this mail," Drucker says. "Some want to hold on to the messages indefinitely, while others plan to destroy them after a few years."

Another way to control the volume of saved e-mail is by filtering for inappropriate content.

"Quite a few companies filter e-mail or analyze its content to stop or remove large or legally questionable attachments," Druker says.

*– Jennifer DiSabatino*

**ONLINE RESOURCE**

■ To sign up for a free e-mail newsletter about the latest research on e-mail management, go to: **www.ferris.com**

## *Which firewall is right for you?*
## *Faster and more secure? Slower and less secure? (Decisions, decisions.)*

*An educated guess: You'd prefer a faster, more secure firewall. If that's the case, your firewall should be from Symantec.™ Symantec Enterprise Firewall,™ for example, is up to 150% faster than our competitor's enterprise firewall. It provides more Web throughput, more file-transfer throughput, and more connections per second, all without compromising security.*

*Symantec Enterprise Firewall provides a greater degree of security because of our Application Proxy Technology. The most robust and secure approach, it allows full inspection of both the protocol and the application layer. This enables you to set granular control policies from desktop to gateway, a powerful feature that lets the right people in—customers, vendors, remote users—while keeping the wrong people out.*

*Our firewalls can protect every tier of your computing environment. We provide solutions for the desktop, as well as a gateway appliance that's easy to deploy and provides flexible implementation. And with our Security Services we can help you plan, implement, manage and maintain a secure firewall solution.*

*Symantec firewalls are a key component of Symantec Enterprise Security. Combining world-class technology, comprehensive service and global emergency response, Symantec Enterprise Security helps businesses run securely and with confidence.*

*Want to make an informed decision about your firewall? Visit symantec.com/ses7 or call 800-745-6054 x9GL1.*

***Just for contacting us, we'll send you a free Security Reference Chart offering a wealth of information about network security.†***

symantec.

# Anatomy of a Hard Disk

DEFINITION

**A hard disk** (also called a fixed disk) is the primary medium for storing information on computers, because it combines high capacity, relatively fast access and low price. A hard disk drive is made up of four basic components: a motor, a spinning platter, a pivoting arm with a read/write head on its end, and electronics to tie everything together and connect it to the outside world.

BY RUSSELL KAY

ALMOST ALL computers today store their digital data as magnetic areas on a device called a hard disk, hard drive or fixed disk.

Basically, all hard drives work the same way: Information is encoded and "written" onto a round, spinning aluminum or glass platter that's been coated with magnetic material. The writing is done by a magnetic head, mounted at the end of an arm that pivots in such a way that the head can be positioned over any part of the platter. The same head also reads the stored data. Special software or firmware on the disk drive and the computer keep track of where any piece of information is stored. Older disk drives devoted one entire side of one platter, along with its head, as a servomechanism to calibrate and regulate platter and arm motion, but current technology doesn't require nearly so much space.

Remember when music came on vinyl records? A disk drive operates a lot like the phonograph. Each has a motor that spins a platter containing information that is written or retrieved by a special device mounted on the end of an arm that pivots across the disk.

There are considerable differences, of course. The LP record was plastic and 12 in. in diameter, and it spun at 33-1/3 rpm. The computer hard drive, once 14 in. or more across, is now no bigger than 3.5 or 5.5 in. in diameter, with those in laptops and handheld devices at 2.5, 1.8 or even 1 in. Hard disks spin at speeds ranging from about 4,000 to 15,000 rpm, and those speeds are likely to increase in the future. And where the phonograph needle physically touched the record groove, the drive heads don't touch the spinning media at all, though they get very close while flying on a cushion of air.

SPECIAL REPORT: STORAGE

Today's disks can store immense amounts of data: About the smallest 3.5-in. hard drive being made today will store 10GB, and capacities for individual drives have reached 100GB. Drive makers have two ways of increasing the capacity of a disk drive. The simplest method is to add additional platters along with a separate head for each side of each platter, and this has been done up to about 16 platters. The second, more basic, way is to increase the amount of data that can be stored on a single area of the magnetic material. This has been the subject of considerable research. Today, IBM has drives that store 25.7GB per square inch, and the company has demonstrated technologies that can quadruple that, to 100GB of data in a single square inch.

The very first disk drive was IBM's RAMAC. Introduced in 1956 the RAMAC's 50 24-in. platters held 5MB of data; the cost was $50,000. In 1980, a 14-in. minicomputer disk cartridge could hold perhaps 5MB or 10MB of data. The original IBM PC in 1981 didn't support a hard disk. When DOS Version 2 came out, the first disk drives appeared for PC-class machines, using 5.25-in. platters that could store 5MB or 10MB and eventually more than 40MB of data.

By 1990, it was common for PCs to come with 40MB disk drives. Five years later, the typical new desktop computer had a 1GB or 2GB hard drive. Nowadays, you can buy laptop computers with 30GB drives, and 48GB 2.5-in. drives have now hit the market.

And as for price, in 1992 I bought an 80MB, 5.25-in. drive at a computer flea market for $300; today's market will deliver a 20GB 3.5-in. hard drive for a little more than $100 retail; that's 250 times the capacity at one-third the price. Put another way, the 1956 disk drive was priced at $10,000 per megabyte. In 1992, I paid just $3.75 for each megabyte of storage; today, my price for that same megabyte is a half-cent.

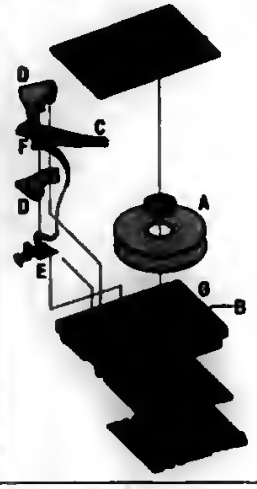
The combination of low price and high capacity came together in 1990, when IBM assembled a group of these inexpensive drives into the first RAID systems that offered security and error recovery to the mix.

Even in today's world of storage-area networks and network-attached storage, the basic building block is the individual magnetic disk drive, and that's perfectly exemplified in the currently popular acronym JBOD — just a bunch of disks.

QuickLink

**ONLINE EXCLUSIVES**

- Our reviewer helps you get at the data on your computer's hard drive: **www.computerworld.com/q?23795**
- A list of links and vendors related to hard-disk technology: **www.computerworld.com/q?23790**




## Inside a Disk Drive

*In this exploded view, you can see the major components that go into a typical drive:*

- **A Platter:** Stores the data
- **B DC spindle motor:** Spins the platter
- **C Head:** Reads or writes data from or to the platter
- **D Actuator:** Causes the arm to move
- **E Printed-circuit cable:** Connects arm and head to electronics
- **F Arm:** Moves across the disk, positioning the head
- **G Chassis:** Cast metal base on which other components are mounted
- **H Protective cover:** Seals the mechanism against dust
- **J Logic circuits:** Handle address translation, data buffering and I/O requests

## Disk or Disc?

For **magnetic media** used on computers, **disk** is the preferred spelling. For other round, flat objects, including **optical storage media** such as CDs – audio or data – and DVDs, the proper spelling is **disc**. And where, you ask, did the "**hard**" come from? It's used in distinction to **floppy disks**, whose magnetic medium was quite flexible but could only be spun at **360 rpm**. The rigid platters in early PC hard drives could spin 10 times as fast – at **3,600 rpm** – while today speeds of twice that are common and several makes have drives that turn at **15,000 rpm**.

■ *Are there technologies or issues you would like to learn about in QuickStudy? Please send your ideas to quickstudy@computerworld.com.*

**Stretching the limits of your data storage systems?**

EDS solved.
eds.com

EMC² PROVEN E-Infostructure

EDS Intelligent Storage Services, with the burstable capacity of Liquid Storage℠, can tame your most volatile e-business flows with confidence, without bursting limited capital budgets. Intelligent Storage Services, offered by EDS and other service providers digitally powered by EDS, gives you the storage capacity you need, when you need it. Call us at 888-889-1392, or visit us online at eds.com/storage, before your current system leaves you all wet.

©2001 EDS. EDS is a registered mark and EDS & Design and EDS Solved & Design are trademarks of Electronic Data Systems Corporation.

# Back It Up

## Running out of disk space and looking for more places to put your data? Wondering how you're going to back it up? Here are some answers. By Russell Kay

FLOPPY DISKS USED TO BE GREAT for backup and moving data or software from one computer to another. Now that even small laptops come with 20GB hard drives, 1.4MB floppies aren't of much use. Some newer laptops don't eveo come witb a floppy drive as standard anymore. But we still have to move, store and archive data. And what about backup? What's the modern equivalent of the floppy?

SPECIAL REPORT STORAGE

At the moment, there's no single type of storage that suffices for everything a floppy once did. But there are more options than ever for removable storage. *Computerworld* has reviewed a variety of devices [Technology, Oct. 30, 2000, and Oct. 25, 1999]. Since those reviews, even more options have emerged.

A number of new storage devices consist of what's essentially a solid-state flash memory chip mounted in a plastic housing with a Universal Serial Bus (USB) connector built in. Depending on your operating system, some require a driver to be installed, while others are automatically detected by the operating system when they are plugged in and appear to the user as just another disk drive. I've recently tried several of these: the $100 32MB DiskOnKey from M-Systems in Newark, Calif.; the $70 16MB Q USB drive from Agaté Technologies Inc. in Cerritos, Calif.; the 16MB ThumbDrive from Trekstor USA Inc. in San Ramoo, Calif.; and EasyDisk, a $139 64MB device imported by Global Channel Solutions Inc. in Norcross, Ga.

They all worked well — just plug any of the devices into a USB port and, bingo, there's storage. And all are fast enough that transfer speed isn't an issue.

The primary differences are in the styling of the plastic; DiskOnKey is the winner for looks, while Thumbdrive takes the prize for smallest. EasyDrive has an LED to show data access and comes with a leather carrying case and lanyard. DiskOnKey comes with a clip for carrying io your pocket like a peo and a ring for keychain mounting. Trek has announced a new model, the ThumbDrive Touch, which contains a built-in fingerprint reader to secure access to that data, but it was unavailable for review at press time.

ThumbDrive ▸ from Trekstor USA is the smallest storage device we looked at.

### Optical Storage

Notebook computers are now starting to become available with CD-RW — ofteo combination DVD/CD-RW — drives, either built in or as an add-on. With such machines, backup on the road becomes very easy. Just leave a CD-RW disk in the drive, and you're all set, with 650MB of backup capacity.

But you say your notebook doesn't have an optical drive? I've recently tried four new, third-party external units that all worked well. The speed champs of the group are two drives from Micro Solutions Inc. in DeKalb, Ill. The $249 Backpack Triple Play and the $269 Bantam CD Rewriter both record CD-R and CD-RW at 8x speed, which is low for a desktop but the fastest available for a portable. Unfortunately, that speed comes at the expense of considerable excess bulk, even in the smaller Bantam model. Another new unit, from San-Jose-based Acer America Corp., is the $199 CRW-6424MU, which is slightly slower but also a bit smaller. The best device for travelers, however, is the $329 CDW24PE Portable CD-RW drive from TEAC America Inc. in Montehello, Calif. The TEAC is a 4x drive that includes a set of rechargeable batteries, yet it is half the size and weight of the Acer.

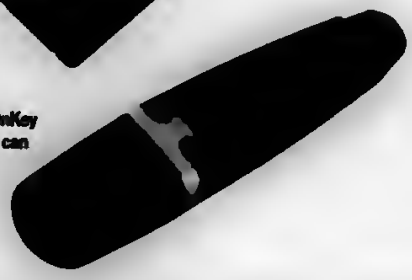
All of these except the Bantam connect to your computer via included USB cords, while the Backpack models also can use the parallel port or a PC Card slot. You might also think about taking along a couple of those new 3-in. 185MB CD-R disks. Their small size makes them great for travel.

Here's another backup solution. If you're trying to run really light and want as small a backup device as you can find, try a compact flash solid-state memory card with a PC Card adapter. This is especially attractive if you've already got compact flash media for a digital camera or personal digital assistant. Compact flash cards are now available with up to 512MB in capacity, and if that's not enough, IBM's IGB microdrive (the platter is one inch in diameter) fits the same PC Card adapter. And IBM will likely introduce a model with higher capacity soon. Another way to use compact flash cards is with the ZiO, a $30 USB adapter from Fremoot, Calif.-based SCM Microsystems Inc.'s Microtech brand. It's even smaller than the PC Card adapter.

If you doo't already have compact flash media, another alternative is Roy, Utah-based Iomega Corp.'s Pocket Zip, formerly known as Clik. It's less expensive, tbough also less capacious, than compact flash, but it may he all you need. These tiny 40MB magnetic disks fit into a PC Card adapter. Four disks plus the adapter sell for just $50.

Finally, if you really need to back up a *lot* of data on the road, your answer may he a portable hard drive. I've used a 650MB PC Card hard drive from Calluna Technology in Fife, Scotland, but I've recently been using similar 1.8-in. drives from Irvine, Calif.-based Toshiba America Electronic Components. The best one, priced at $399, holds 5GB worth of data and doesn't need special drivers; a 2GB model costs $299. This may be all the backup you ever need. ▸

◂ Toshiba PC Card 5GB portable hard drives from Toshiba don't need special drivers.



DiskOnKey ▸ The 32MB DiskOnKey from M-Systems can be hooked to a keychain.

# Nothing New Under the SAN

I'M A RELATIVELY NEW columnist for *Computerworld*, but I have a 16-year history with its publishing parent, International Data Group Inc. (IDG). I've spent most of that time writing for sister IDG publication *InfoWorld*, but I also started the Web publication *LinuxWorld* and ran the short-lived IDG Web publication *Network Computing World*.

Before I explain why I've brought this up, I have to tell you first how pleased I am that all of my months of begging Editor in Chief Maryfran Johnson to bring me on board finally paid off. I'm thrilled to be part of *Computerworld*.

I mention this not only for the self-serving purpose of sticking up for management but also for the self-serving purpose of saving, I told you so with more authority than I've earned with the few columns I've written for *Computerworld*. But if that isn't authority enough, you can go as far back as the Bible's Book of Ecclesiastes, which also told you so. It says [illegible] nothing new under the [illegible]

[illegible]

More specifically [illegible] we hooked [illegible] began to face problems [illegible] (HSM). It [illegible] centric data centers [illegible] it's nothing new [illegible]

In case you were [illegible] HSM [illegible]

[illegible] HSM [illegible] NAS [illegible] HSM solution that has to [illegible] details of every client [illegible] today's typical decentral [illegible] heterogeneous environment [illegible] AS 3000s, Windows [illegible]

[illegible] the problem that [illegible] the Storage Net[illegible] Industry Association [illegible] organization, is [illegible] the Network Data Management Protocol (NDMP) standard, which [illegible] many backup and [illegible] management software [illegible] use.

The point of NDMP is [illegible] make it possible for developers to focus on creating better data management software instead [illegible]

[illegible] NDMP [illegible] NFS and CIFS [illegible] common [illegible] HSM [illegible] files while [illegible] people from having to know where the file is stored. NDMP insulates data management developers from dissimilar file system features and protocols. Likewise, the ideal SAN should insulate administrators and users alike from the details of network file systems and protocols.

But even if the typical SAN ends up supporting multiple protocols, it's still a way to aggregate dissimilar islands of data into a whole while making many of the details of each island transparent. In short, a SAN provides some of the virtual centralization of data that's needed to make data more manageable. And centralization, whether real or virtual, takes us one step closer to re-creating the mainframe computing model.

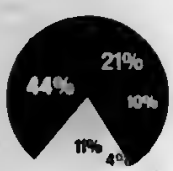
And that's one step closer to my being able to say I told you so.

NICHOLAS PETRELEY [illegible] author in Hayward, Calif. [illegible] nicholas@petreley.com

## Storage Snapshots

### SAN Breakdown

[illegible]




Base

### NAS Breakdown

[illegible]

Base

### Storage Software Leaders

*The top vendors, based on worldwide storage software revenue*

| | 2000 MARKET SHARE | 1999-2000 GROWTH |
|---|---|---|
| 1. EMC | 28.9% | 74.3% |
| 2. Computer Associates | 18.7% | -20% |
| 3. Veritas Software | 15.1% | 64.2% |
| 4. IBM | 9.2% | 8.8% |
| 5. Legato Systems | 3.4% | -14.3% |

### Storage Predictions by the Numbers

- [illegible] RAID and network attached storage [illegible]
- [illegible] storage management software [illegible] 2006
- Disk usage rates [illegible]
- [illegible] annual digital output [illegible]

NICHOLAS PETRELEY

# Nothing New Under the SAN

**I'M A RELATIVELY NEW columnist for *Computerworld*, but I have a 16-year history with its publishing parent, International Data Group Inc. (IDG). I've spent most of that time writing for sister IDG publication *InfoWorld*, but I also started the Web publication *LinuxWorld* and ran the short-lived IDG Web publication *Network Computing World*.**

Before I explain why I've brought this up, I have to tell you first how pleased I am that all of my months of begging Editor in Chief Maryfran Johnson to bring me on board finally paid off. I'm thrilled to be part of *Computerworld*.

I mention this not only for the self-serving purpose of sucking up to management, but also for the self-serving purpose of saying "I told you so" with more authority than I've earned with the few columns I've written for *Computerworld*. But if that isn't authority enough, you can go as far back as the Bible's book of Ecclesiastes, which also told you so. It says that there's nothing new under the sun. (It says a lot more than that, but we can stop there for the purpose of discussing storage technology.)

More specifically, I've said for a long time that from the moment we hooked up one PC to another, we began to face problems that would eventually force us to reinvent the mainframe model of computing. Take hierarchical storage management (HSM). It hit the radar screens of PC-centric data centers a few years ago, but it's nothing new to mainframe mavens.

In case you were out sick that day, HSM magically migrates some of your aging data from expensive storage to cheaper storage without users having to know that anything moved. The only thing users notice is that the spreadsheet they haven't touched in a year takes longer to load because the HSM software snuck it onto a tape, leaving only the illusion of the file behind.

Network-attached storage (NAS) and storage-area networks (SAN) pushed HSM off the front page, but they're nothing new either. NAS products are cool because most of the time, you just plug them in and start using them, with a minimum of effort. But under the hood, you'll find a normal operating system, usually a flavor of Unix, running a Swiss Army Knife of network file server protocols.

Multiple protocols and file formats are the reason why HSM was so easy to upstage. It's hard enough for a NAS appliance to provide all these services in one box. Imagine how difficult it is to build an HSM solution that has to deal with the details of every client and server in today's typical decentralized and heterogeneous environment of Unix boxes, AS/400s, Windows clients and so on.

This is the problem that spawned the Storage Network Industry Association standards organization, as well as the Network Data Management Protocol (NDMP) standard, which is what many backup and data management software products use.

The point of NDMP is to make it possible for developers to focus on creating better data-management software instead of worrying about evolving file systems and network protocols. The burden rests upon the vendors of storage appliances to figure out how to support NDMP, whether they add it as a layer on top of NFS or Common Internet File System (CIFS) or build it right into the operating system.

NICHOLAS PETRELEY IS A computer consultant and author in Hayward, Calif. He can be reached at nicholas@petreley.com.

It's a long shot, but I'm counting on the success of SANs to pressure vendors into creating a protocol like NDMP to replace protocols like NFS and CIFS entirely or adopt and advance just one of them. There's a common thread across all these storage issues: insulation. HSM archives files while insulating people from having to know where the file is stored. NDMP insulates data management developers from dissimilar file system features and protocols. Likewise, the ideal SAN should insulate administrators and users alike from the details of network file systems and protocols.

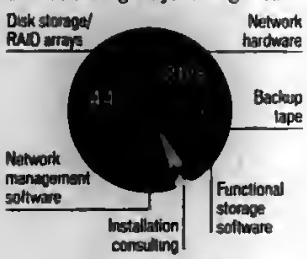
But even if the typical SAN ends up supporting multiple protocols, it's still a way to aggregate dissimilar islands of data into a whole while making many of the details of each island transparent. In short, a SAN provides some of the virtual centralization of data that's needed to make data more manageable. And centralization, whether real or virtual, takes us one step closer to re-creating the mainframe computing model.

And that's one step closer to my being able to say I told you so. ◗

# Storage Snapshots

## SAN Breakdown

*On average, the cost of a company's storage-area network technology is divided among the following areas:*

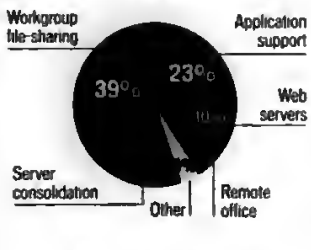



**Base:** Survey of 203 companies planning to use or using SANs

SOURCE IDC FRAMINGHAM MASS 2000

## NAS Breakdown

*On average, a company's network-attached storage resources are devoted to the following:*




**Base:** Survey of 259 companies planning to use or using NAS systems

SOURCE IDC FRAMINGHAM MASS 2000

## Storage Software Leaders

*The top vendors, based on worldwide storage software revenue:*

| | 2000 MARKET SHARE | 1999-2000 GROWTH |
|---|---|---|
| 1. EMC | 28.9% | 74.3% |
| 2. Computer Associates | 18.7% | -20% |
| 3. Veritas Software | 15.1% | 64.2% |
| 4. IBM | 9.2% | 8.6% |
| 5. Legato Systems | 3.4% | -14.3% |

SOURCE IDC FRAMINGHAM MASS 2001

## Storage Predictions by the Numbers

- The worldwide **RAID and network-attached storage** market will grow annually by 18.4%, to $69.7 billion in 2006.
- The worldwide **storage management software** market will grow annually by 26.1%, to $16.7 billion in 2006.
- **Disk usage rates** are estimated to be between 30% and 60%. Most companies have targets of between 85% and 90%.
- Worldwide, **annual digital output** would amount to 1.5 billion gigabytes of storage.

SOURCE "WHAT CONTINUES TO DRIVE STORAGE GROWTH?" JUNE 2001 GARTNER INC STAMFORD CONN

active archive

**Introducing Active Archive Solutions: The intelligent way to optimize database performance.** Active archiving is a breakthrough way to relieve the pain of overloaded databases, sluggish application performance and endless hardware upgrades. Database size is dramatically reduced by systematically setting aside infrequently used data. However, the data is always kept close at hand for easy access. Best of all, you save money by optimizing the hardware you already have. Get smarter. Call 800-457-7060 or visit **www.storesmarter.com.**

princeton softech

© 2001 Princeton Softech Inc. All rights reserved.

If You're Building A SAN, Why Not Consider Using The Same Solutions
That Are At The Heart Of 96% Of The World's Storage Networks?

McDATA

**Senior Software Engineer**
Resp for architecting and developing application of virtual machine technology for scalable resource management. Duties include designing and implementing software that provides resource management for server products, and publishing results. Reqs Ph D in CS and 3 yrs expin research or development of software. Doctoral focus and exp must be in application of virtual machine technology for scalable resource management. C/C++, UNIX Salary DOE Send resume to www.sym@vmware.com or HR, 3145 Porter Dr., Bldg. F, Palo Alto, CA 94304

**SOFTWARE ENGINEER, SALES MANAGER, AND BUSINESS ANALYST**

Glendale based IT Company has multiple openings for Software Engineers, Sales Managers, and Business Analysts. These positions may require travel throughout the U.S. For consideration please send resume and salary history to:
Tinnus Corporation
108 North Brand Blvd.
Suite 201
Glendale, CA 91203

IT firm in Detroit, MI seeks to fill the following positions.

SAP CONSULTANTS: development & implem of functional modules such as FI/CO, MM, SD, PP ABAP Programming.

PROGR ANALYSTS: Participating in all phases of s/w develop cycle using Oracle 7/8 and/or Java Tools.

DESIGN ENGINEERS.
1. Design, implem, data migration, testing of PDM systems-Metaphase/Windchill/Enovia Exp req'd in areas such as Oracle RDBMS, UNIX, Java, C, C++, *SQL*PLUS, PL/SQL.
2. Development of ICAD & other KBE Object Oriented Systems. Strong background in CAD/CAM/CAE req'd.

Must have Bachelors or Masters or equiv in CS, Mechanical, Electrical, Bus Adm, Finance or related field; & 1-5 yrs exp in the req'd area.

Positions available in Detroit, MI and to client sites throughout US including MA, NY, TX, WA. Pls mail resume to HR, 32255 Northwestern Highway, #248, Farmington Hills, MI 48334

Computer Positions: Programmer Analyst, System Analyst, Software Analyst, Network Analyst, Systems Engineers. Network Engineers, Database Analysts, IT Marketing Specialist, and other technical professional. Multiple openings nationwide. Client sites. We need professionals with at least a bachelor's degree in computer science, engineering, mathematics, statistics, related technical fields, or any business and 1+ year of relevant experience. Fax resumes to 212-224-5082, att: Dept. C

Computers/Software Developers
CommVault Systems, Inc. seeks Software Developers. Dev s/ware products using C/C++ for PC/UNIX platforms. Req: Master's degree Comp Sci, Eng'g, Sys Eng'g, or rel disc & 5 yrs exp in position offered or 8 yrs exp as a programmer or systems analyst. Must have exp with MS VC++ S.D. Res to thoffman@commvault.com EOE.

Sr Sys. Analyst to write & design basic & advanced prog. in an AS/400 dev/support environment for utility industry, using RPG/400 & CL/400 prog. techniques. BS. in Math. or Comp. Sci. + 8 yrs exp. in job offered. Mail resume to Miles Hand, HR Dept, HTE Inc., 1000 Business Center Dr. Lake Mary, FL 32746 EOE

Computers/Software Engineers

Pinkerton Computer Consultants, Inc.
Pinkerton Computer Consultants, Inc., a proven leader in providing information technology services for more than 30 years currently seeks Software Engineers for long term and challenging projects/employment. Qualified applicants will have MS in Comp Sci, Math or Eng'g, 2 yrs exp as software engineer or 2 yrs exp as applications engineer, programmer or rel occ. Must have exp. w/Visual Basic, MS Access, & SQL Server. Please fax resumes to Paul Sanford, Senior Recruiter (617) 227-0057. PLEASE REFERENCE CODE: SE2/PS.

Systems Engineer for Plantation, FL. Install, configure, upgrade and provide ongoing support for computer networks, local/remote connectivity, Internet access, E-Mail, Web Hosting, FTP, VPN and Remote Access. Design & implement business software, client/server applications, multimedia & internet technology. Maintain network communication software. Proficient in MS Windows NT & Novell network administration configuration and certification as MCSE. Professional + 1 & Trainer required. Fulltime position. M-F. Competitive salary. Applicants with Bachelor's degree in Computer Information Systems or related field or equivalent based upon a combination of education & experience and 2 years related experience. Send resumes only to Human Resources Dept., Attn: Ileana Valles, Lundy and Shuster, P.A., 9655 W. Broward Blvd., Plantation, FL 33324

SOFTWARE Positions open at Callidus Software, San Jose. Software Eng., DBA, Network & Comp. Sys. Admin. Send resumes to hr@callidussoftware.com REF #053

Multiple positions available for computer professionals including Soft Eng'rs, P/A's, DBA's, Systems Analysts, Network Analysts, Systems Admin's, SW Developers, Website Developers. Locations vary. Openings now w/ leader in the field including Aerotek, Maxim Group, TEKsystems. Onsite & Allegis Group. Req's travel & degree (Bach, MS or equiv) in relevant field. Competitive sal & benes.

Resume to: S. Monticelli, Allegis Group, HR, 6992 Columbia Pkwy Dr, Columbia, MD 21046 ID Job No. 10-01-2001

Computer Positions: Programmer Analyst, System Analyst, Software Analyst, Network Analyst, Systems Engineers. Network Engineers, Database Analysts, IT Marketing Specialist, and other technical professional. Multiple openings nationwide. Client sites. We need professionals with at least a bachelor's degree in computer science, engineering, mathematics, statistics, related technical fields, or any business and 1+ year of relevant experience. Fax resumes to 212-224-5082, att: Dept. MIL.

LEAD PROGRAMMER/ANALYST (Columbia, SC) to design, develop, implement, integrate and support computer software for agricultural bank loan applications using C/C++, Visual Basic, Visual C++, Object Oriented design, COM, Multi-tiered Architecture, Data Modeling, SQL, Stored Procedures, MTS or COM+ and SQL Server 2000 on Windows 98/NT/2000. Req Bach. degree (or foreign equivalent) in Computer Science, Electrical Engineering, or a closely related field, with 2 yrs exp. in the job offered or as a Programmer/Systems Analyst. Exp. must include 2 years using C/C++. Competitive salary and benefits. 8-5, M-F. Send resume to Recruiter, AgFirst Farm Credit Bank, P.O. Box 1499, Columbia, SC 29202. Attn: Job BS - (No Phone Calls Please)

We seek exp'd IT professionals with industry exp with the following skills (various skills combination req'd): Unplex, MS Graph, Formula One Data Windows, Win NT/Unix/ Novell Servers & Protocols, Pro*C, DTMF, Oracle Express, Oracle Power Tools, SQL * Net optimization, ODBC drivers; study/analyze heuristic algorithms etc. Pay matching with exp. Foreign educ. Equiv &/or combination of edu/exp. accepted travel relocation reqd. Res. only to OST Int'l Corp., 1300 Iroquois Drive, Ste 255, Naperville, IL 60536

SOFTWARE ENGINEER
Software engineer to design, develop and test computer programs for business applications, analyze software requirements to determine feasibility of design, direct software system testing procedures using expertise in Developer/2000, Oracle and Perl. Requirements: Bachelor's Degree, educational or functional equivalent, in Computer Science or related field and two years experience as a software engineer or computer programmer. Knowledge of Developer/2000, Oracle and Perl. Salary: $65,000/year. Working Conditions: 8:00 A.M. to 5:00 P.M., 40 hours/week, involves extensive travel and frequent relocation. Apply: Manager, Armstrong County Team PA Careerlink, 1270 North Water Street, PO Box 758, Kittanning, PA 16201-0759. Job No. WEB201421

Commerce Applications Consultant, Job location: Conshohocken, PA. Duties: Design, develop & implement appls for web enabling business using JAVA & XML technologies. Resp for performing legacy system integration & maint. Develop messaging solutions using XML, EDI and IBM MQ Series. Requires: M.S. in Comp or Info Sci. Engr, or related field & 3 yrs. exp. in the job offered or 3 yrs. exp. as a Software Eng. or Analyst/Prog. Will accept B.S. (or foreign equiv) & 5 yrs prog. exp. in the comp ind in lieu of M.S. & 3 yrs. exp. Concurrent exp. must incl. 3 yrs. exp. designing & developing appls using JAVA & 3 yrs. exp. performing legacy system maint. EOE. 40 hrs./wk., 8:00 a.m. to 5:00 p.m. Send resume (no calls) to: Diane Tuccito, AnswerThink, Inc., 517 W. Peachtree St., Suite 600, Atlanta, GA 30308

Computer- TATA INFOTECH provides sophisticated IT solutions to various commercial organizations and offers a comprehensive suite of services to deliver end-to-end software solutions. We're part of Tata conglomerate and are headquartered in India, with operations worldwide.

TATA INFOTECH

- **PROGRAMMERS/ANALYST** Leader: AP/T1. Req. 1+ yrs exp.
- **SR. ANALYST PROGRAMMERS** Leader: SP/T2. Req. 3-5+ yrs.

exp. in IT industry to advance programming & system analysts.
- **TEAM LEADERS** Leader: TL. Req. 5+ years exp. in leading large project teams.

All positions req. BS/MS in CS or related field and proficiency in one or more of the following: **Languages:** COBOL, CICS, Assembler, UNIX, IDNL, C++, Perl and PL1. Java. **Platforms:** IBM mainframe, Unisys mainframes, Unix, NT. **Databases:** Oracle, Informix, DB2, Progress, TMS, MS SQL server. **Front-end:** Developer 2000, VC++, Power Builder and VB. **Web Technologies:** Websphere, Weblogic, ASP, IIS, MQ series, Tuxedo. **Case Tools:** Designer 2000, ERWIN, UML, Rational Rose and any other case tool. **Network Technologies:** LAN/WAN, TCP/IP routers, switches, gateways, firewall. **Support:** System maintenance, break fix maintenance, network administration and support.

Position openings are at several locations nationwide and the selected person could be offered posting at any of the company's project sites in the US. The job may require substantial traveling and may require relocation. TATA INFOTECH is an equal opportunity employer. E-mail your resume, mentioning the position code in the subject line, to: jobs.us@tatainfotech.com

ENGINEERING GENERAL MANAGER & CEO - Overall management of the company. Ensure the project in conformance with technical/contractual requirements & time schedules. Accept report from all managers. Establish company strategic goals & evaluate the managers performance. Must have in-depth knowledge of the Brazilian Air Transport System &experience with Air Traffic Control & Airports Projects. 10 yrs exper.in managing of multidisciplinary professional team with responsibility over multi-million dollar project.
PROGRAM MANAGER: Manage, specify, develop, integrate, metal, quality assurance & logistic support for air traffic control & air traffic management systems. 7 yrs exper. managing min 25 workers w/responsibility over multi-million dollar revenue. Experience w/ as traffic control & flow management, image management, command & control & simulators systems, application of mil-std procedures.
ENGINEERING PROGRAM MANAGER - Coordinate multidisciplinary projects, experience in air traffic control, defense & surveillance systems, logistics management, technology absorption. Conduct business communications in Portuguese with Brazilian govt organizms & parent organizm in Brasil. 7 yrs management experience min. 10 professionals with responsibility over multi-million-dollar revenue.
ENGINEERING EXECUTIVE VICE PRESIDENT - Technical, financial & commercial mgmt of procurement & acquisn of services and goods. 7 yrs exper managing min 30 workers with responsibility over multi-million dollar revenue. Exper w/ mgmt of complex multi-disciplinary engineering projects.

All candidates must have B.S. in Engineering & fluency in Portuguese. 40 hr/wk, M-F 9am-6pm. Job in Woburn, MA. Prevail. Wage. Fax resume to 781-937-94 58.

**SAP Developers**

System Integration and Consulting Service is engaged in cutting edge SAP software consulting and support. At this time, we have three opportunities in our Coppell, TX office. Systems Analysts will work in various locations throughout U.S. Candidates must possess at least a Bachelors degree or equivalent in education and/or experience.

**&ystems Analyst/Software Developer.** 3 years exp. SAP ABAP/4, SD, MM and FI req'd. **Attn: Job K**

**Sr. SAP Systems Analyst.** 2 years exp. SAP ABAP/4 Reports, Transactions, SAP-Script and BDC req'd. **Attn: Job M**

**Sr. SAP Systems Analyst.** 4 years exp. ABAP/4, SAP-Script, SI, LC and IS-Oil req'd. **Attn: Job N**

For consideration please fax resume to: Ronald Schaem, Office Manager (972) 745-1322 or e-mail Ronald@sowaa.com

EOE

INFORMATION TECHNOLOGY PROFESSIONALS
JP MORGAN CHASE & CO.
Based in NYC, multiple positions (all levels) are avail for the following: Systems Analysts, Prog/Analyst, Sr. & other Technology Officers, Software Engineers, Software Developers & Designers, Project & Team Leaders, Database Admins. & Specialists, Tech Specialists, Support Analysts & other IT positions. Positions avail req'g bachelors or masters degree in Comp. Sci, Engineering (any type), MIS, CIS or Business Admin or related quantitative & tech. field or equiv combination of work experience and education and/or exp. In any of the above or similar IT positions. Pls forward your resume, incl. salary history to The Chase Manhattan Corporation, 5MM 1001, WW P.O. Box 1004, Wall Street Station, NY, NY 10268. The Chase Manhattan Corporation is an Equal Opportunity/Affirmative Action Employer.

SYSTEMS ANALYST to analyze, design, develop, configure and implement system architecture in a client/server environment using MS SQL Server MS Excel, MS Access, MS Outlook, MS Exchange, HTTP and XML under Windows NT/2000 operating systems. Administer UNIX and NT systems, including systems backup, restoring, implementing and systems recovery planning using LAN-WAN, TCP/IP and Cisco Router. Require: Bachelor's degree (or equivalent) in Computer Science/Engineering, Business Administration, or a closely related field with two years of experience in the job offered or as a Network Administrator. Each three years in progressively responsible work experience in the field will be considered equivalent to one year of college education. Competitive salary offered. Apply by resume to: Rafiq Jivani, President, Global Consulting Services Inc., 3675 Crestwood Parkway, Suite 250, Atlanta, GA 30096. Attn: Job EJ.

**Programmer/Analysts**
**End-User Support Specialists**
**Application Developers**
BS degree in Computer Science or directly related field (or equivalent) with 1-5 years of experience required. Please indicate the specific title of the job for which you are applying on your application letter. Contact Jill Rickham, Maverick Tube Corporation, 16401 Swingley Ridge Road, Suite 700, Chesterfield, MO 63017

*the place where your fellow readers are getting a jump on even more of the world's best jobs.*

Stop in a visit.
See for yourself.

careers.com

We're the work leader in helping customers and companies stay connected. Over the phone, on the Web, by fax. Our customer relationship solutions enable businesses to interact with their customers on a personal basis. And that makes all the difference.

**ACS Consultant/Software Engineer**

The Developer Consultant provides services and technical support to clients through software application development. Responsible for analysis, design, coding, testing, and integration of complex software application solutions. Requirements include an MS in Engineer/Computer Science/Information Systems, MBA or BS in these disciplines, plus 0-6 years of experience.

Experience with database systems including DB2/2, Oracle and Sybase required, along with knowledge of C, C++, Visual Basic, Client/server win95/98/2000, and/or NT, and and/or UNIX, knowledge of at least one network operating system (Novell LAN Manager, LAN Server, Banyon Pines) necessary. Job locations are throughout the US.

Aspect offers outstanding career opportunities and a highly competitive compensation/benefits package. To forward your resume (referencing Job Code: ACS001/RIR/INFOW) e-mail: staffing@aspect.com, fax: (408) 325-2942; or mail Aspect Communications, Attn: Staffing Department, 1310 Ridder Park Drive, San Jose, CA 95131 EOE/AAE. www.aspect.com

**PROJECT ENGINEER**

For company in Denver, direct, coordinate definition, construction, implementation of Smallworld sftware systems at client sites within defined time, budget. Responsible for integration of Smallworld sftware into clients site gap analyses, managing customs solution design/development/implementation, customer technical interface. Managerial duties incl. scheduling, controlling scope of project, customer communication, internal team support, project reports. Travel req. Req BS or foreign equiv in comp sci or related field plus 3 yr exp in the position or related occupation of GIS applications dvlpmnt. Also req working knowledge of Smallworld 9-5, 40 hrs/wk., $110,000/yr. Mail resume to Colo Dept. of Labor, Attn: Jim Shimada, 1515 Arapahoe St., #400, Denver, CO 80202-2117. Refer to job order number CO5006913.

Software Engineer sought by company in Denver, CO specializing in business software solutions to work in Denver & other unanticipated job sites in the US. Under close supervision, engage in moderately complex tasks regarding the design & development of software applications & software tools. These software applications incorporate client/server architecture &/or are web-based. Additionally design and develop middleware which allows different software applications to communicate with one another. Analyze requirements. Create designs & design documentation. Code, test, & de-bug the software applications. Use XML technology, Active Server Pages (ASP), Visual C++, & C in the design & development process. Work is closely monitored. Requires Bachelor's in computer science or related field 8am-5pm, M-F. $51,350/yr (2 openings). Respond by resuming to James Shimada, Colorado Department of Labor & Employment, Employment & Training Division, Tower II, #400, 1515 Arapahoe, Denver, CO 80202, & refer to Job Order Number CO 5006919.

SAP Functional Consultant sought by company in Boulder, CO specializing in software consulting to work in St. Louis, MO & other unanticipated job sites in the US. Perform thorough business needs analyses & identify product configurations & define connectivity & integration requirements in the context of the SAP R/3 system. Identify training, testing, & database conversion requirements & provide technical support documentation for the financial accounting & controlling SAP modules (FI/CO). Serve as project team lead to integrate FI/CO with other SAP modules, including purchasing, human resources & materials management. Using ABAP programming language, produce programs to produce reports necessary for clients. Requires 4 yrs. as an SAP consultant, working knowledge of SAP R/3 FI/CO, purchasing, human resources & materials management modules, as well as ABAP programming language & team leader or team management processes. 8am-5pm, M-F. $100,000/yr. (2 openings). Respond by resume to James Shimada, Colorado Department of Labor & Employment, Employment & Training Division, Tower II, #400, 1515 Arapahoe, Denver, CO 80202, & refer to Job Order Number CO5005840.

Junior Programmer Determine needs, write programs and debug under supervision. Provide client assistance in using software. Req: Bachelors in Comp. Sci., Comp. Eng., Business Admin or Economics with courses in programming. 40-hr wk. Job/interview site: Glendale, CA. Please send resume to: Vidfilm International Digital, 1631 Gardena Ave., Glendale, CA 91204, Attn: HR Dept. BX-9.

Senior IT Consultant (Senior Software Engineer) sought by company in Denver, Colorado, specializing in land management services/solutions to work in Houston, Texas and other unanticipated sites in the U.S. At a senior level, design, develop, enhance and support integrated object-oriented software applications that run in a Windows environment and/or are Web-based for land management in the oil and gas industry to manage multiple leases, contracts and division orders. Software applications incorporate Graphical User Interfaces (GUIs), client/server architecture and Oracle Relational Database Management Systems. Use PL/SQL, JAVA, Visual Basic, ASP, PowerBuilder, the Install Shield tool, and other development tools and languages. Engage in project management as required. This position requires a master's or equivalent - specifically it requires a master's degree or foreign equivalent in computer science, engineering, mathematics, or a related field plus three years of progressively more responsible software development experience or a bachelor's degree or foreign equivalent in computer science, engineering, mathematics, or related field plus five years of progressively more responsible software development experience, and working knowledge of the design and development of oil and gas software applications, PowerBuilder, Oracle, and PL/SQL. 8am - 5pm, M-F, $72,000/yr. Respond by resume to James Shimada, Colorado Department of Labor & Employment, Employment & Training Division, Tower II, #400, 1515 Arapahoe, Denver, Colorado 80202, & refer to Job Order Number CO 5005819.

Software Engineer sought by company in Denver, CO specializing in business software solutions to work in Denver & other unanticipated job sites in the US. Under close supervision engage in moderately complex tasks involving design & development of manufacturing software applications that incorporate client/server architecture & interface with ORACLE relational database management systems &/or the tools used to create such applications. Analyze user requirements. Create designs and design documentation. Code, test and de-bug the software applications. Use programming language C & MRP concepts in the design & development process. Work is closely monitored. Requires Bachelor's in comp sci or related field (incl mfg. systems eng.) 1 yr. in development of software applications that interface with ORACLE relational databases working knowledge of programming language C & manufacturing resource planning (MRP) concepts (working knowledge may be gained through employment experience or in an academic program). 8am-5pm, M-F, $52,000/yr (2 openings). Respond by resume to James Shimada, Colorado Department of Labor & Employment, Employment & Training Division, Tower II #400, 1515 Arapahoe, Denver, CO 80202, & refer to Job Order Number CO5006010.

Manager of Consulting Methodologies sought by company in Denver, CO specializing in business software solutions to work in Denver & other unanticipated job sites in the US. Develop software implementation, integration & customization tools, techniques & methodologies that will enable international clients & field consultants to effectively implement ERP (enterprise resource planning) software applications. Train technical field consultants in use of the tools, techniques & methodologies. Develop automated business process testing tools & scripts for use by technical field consultants. Develop standard business process models that can be used by international clients in business process re-engineering to standardize & optimize their manufacturing, logistics & distribution processes. Requires 2 yrs. implementing ERP software applications including business process re-engineering of manufacturing, logistics & distribution process as 8am-5pm, M-F. $86,600/yr. Respond by resume to James Shimada, Colorado Department of Labor & Employment, Employment & Training Division, Tower II, #400, 1515 Arapahoe, Denver, CO 80202, & refer to Job Order Number CO 5006014.

Sierra IT Inc is a global IT systems integration and solutions firm headquartered in Dearborn, Michigan. We provide IT specialty services in business consulting, systems development, integration, and managed support. We are currently looking for the following:

Software Engineers: to research, execute design and develop Internet applications using C++, JAVA, Corba, XML. Develop specific web based financial applications using Sybase data bases. Requires a Master's degree in Computer Science or related and 1+ year of experience.

Programmer Analysts: To plan, develop, test, and document web technologies and Java technologies for business procedure analysis. Use Visual Basic for receiving data and for EDP. Design product features to meet requirements. Requires Bachelor's degree in computer Science or related and 1+ year of experience.

Send your resume to: HR Manager, Sierra IT Inc., 3 Park Lane Blvd., Suite #521W, Dearborn, MI 48126.

Software Engineer sought by company in Englewood, CO specializing in software development, sales & services at work in Pittsburg, PA & other unanticipated job sites in the US. Under close supervision design & develop geographic information systems software applications for utilities & telecommunications companies. The software applications incorporate client/server architecture & some incorporate relational database management systems & run on UNIX & Windows operating systems. Analyze requirements, code, test & debug the software applications. Implement & customize applications per client needs. Create documentation. Provide user training as needed. Work is closely monitored. Utilize Pro C, proprietary programming languages & proprietary tools in designing & developing the software applications. Requires Bachelor's in computer science or information systems management, working knowledge in geographic information systems & telecommunications (working knowledge may be gained through employment or in an academic program). 8am-5pm, M-F, $54,580/yr. Respond by resume to James Shimada, Colorado Department of Labor & Employment, Employment & Training Division, Tower II #400, 1515 Arapahoe, Denver, CO 80202, & refer to Job Order Number CO5005853.

**Systems Applications Specialist, Romeoville**

Use Visual Basic, PowerBuilder & ASP to design & develop client/server & web based applications, work with end users & business analysts to define goals for multiple applications. Use structured analysis, data modeling & information engineering to design the applications. Prepare specifications, flow charts, and diagrams that describe the system(s) in terms that the user can easily understand. Specify the user input required by the system, design the processing steps, format the output to meet the user's needs; define system security requirements, determine hardware requirements.

Ed: Master in Computer Science, 1 yr exp in job

Annual Salary: $63,000.00, 37.5 hr/wk.

Applicants must show proof of legal authority to work, excluding those with temporary work authorization. Applicants to send resumes to:

Illinois Dept. of Employment Security, 401 South State St.-7 North, Chicago, Illinois 60605

Attention: Sheila Lindsey

Reference #V-IL-26716-L. AN EMPLOYER PAID AD. NO CALLS - SEND 2 COPIES OF BOTH RESUME & COVER LETTER.

**PRINCIPAL SOFTWARE ENGINEER**

For company in Denver, research, architect, design, develop software systems in conjunction with product development for EAI (Enterprise Application Integration) and internet applications in the GIS and utility industries. Use Oracle, SQL Server, C/C++, Microsoft.NET, Site Server, Vignette, ActiveWorks, ESRI and Java technologies. Develop and direct software testing, programming & documentation using structured methodologies, including RUP (Rational Unified Process). Req. MS or foreign equiv in comp. sci. or related field plus 1 yr exp in the position or related occupation of software engineer. Also req. working knowledge of GIS and Microsoft Certified Solutions Developer certification. 8-5, 40 hrs./wk., $80,000/yr. Mail resume to Colo Dept. of Labor, Attn: Jim Shimada, 1515 Arapahoe St., #400, Denver, CO 80202-2117. Refer to job order number CO5005642.

Software Engineer sought by company in Denver, CO specializing in DBS services to work in Englewood & other unanticipated job sites in the US. Under close supervision engage in full life cycle software development. Specifically, design & develop client/server applications for communications processes. The software applications incorporate relational database management systems and run on Windows/NT platforms. Analyze requirements, create designs & design documentation. Code, test, debug, modify & enhance the software applications. Work is closely monitored. Develop test procedures & methodology & prepare test proposal. Test software developed by other groups as needed. Train users as needed. Utilize C++, Visual C++ & Access in the design and development process. Requires Bachelor's in comp. sci. or eng. (incl. mech'l eng. or mfg. sys. eng.) working knowledge of C++, Windows/NT operating systems and developing testing methodology & procedures (working knowledge may be gained through employment experience or in an academic program). 8am-5pm, M-F, $48,000/yr. Respond by resume to: James Shimada, Colorado Department of Labor & Employment, Employment & Training Division, Tower II #400, 1515 Arapahoe, Denver, CO 80202, & refer to Job Order Number CO 5005851.

Database Administrator (2 positions) - Will coordinate physical changes to computer databases and code, test and implement the database applying knowledge of database management systems. Will design logical and physical databases and coordinate database development. Requires Master in Computer Science, Engineering or Mathematics. Must have 4 years experience in the job offered or 4 years experience as Network Administrator. 5 day, 40 hr/wk, $75,000/yr. Please mail resumes to Colorado Department of Labor and Employment Programs, ATTN: Jim Shimada, Two Park Central, Suite 400, 1515 Arapahoe Street, Denver, CO 80202-2117 and refer to order number CO5005694.

Manager of Networking and Technical Support. Midwest based, international distributor seeks an experienced IT Manager to lead and direct department focused on network administration and technical support. Position requires working knowledge of Plant Systems, Inc. software applications. B.S. Degree in Computer Science or related area required; advanced degree strongly preferred. Please forward resumes and salary requirements to: Deroo Aerospace, Inc., Human Resources - Ad # IT-CW, P.O. Box 250970, Milwaukee, WI 53225. EO/AAE.

Microtrader, Inc., an IT/Publishing Co seeks Sr. Quality Assurance Engr specializing in s/ware applic dvlpmnt at its Greenwood Village, Co office. (MS+3 yrs exp or BS+5 yrs exp). Respond by resume to HR-MS, 8200 S. Syracuse Way, Ste 300, Greenwood Village, CO 80111.

IT Professionals

Entergy, one of America's largest utility companies, has multiple openings for the following occupations in multiple locations:

- Information Technology Professionals
- Systems Analysts
- Computer Programmers
- Software Engineers

For immediate consideration please forward your resume and salary requirements to Entergy Corporation and operating subsidiaries, Attn: Ms. Lori Hendler, HR Department, PO Box 61000, New Orleans, LA 70161. Phone: 504-576-4117. EOE/M/F/D/V. Principals only. You will only be contacted if you are considered for an interview.

Software Engineer, St. Louis, MO & various unanticipated locs in US. Dsgn & implmnt s/ware applics that coord fin'l & mgmt data for clients utilizing SAP (integrated mfg operational & fin'l applic comp s/ware product). Asses client's needs & their interface capabilities for data & operating systems. Analyze s/ware reqmts & formulate & dsgn s/ware system. Dvlp & direct system testing. MS in Comp Sci/Eng/Math/Info Sys. w/1 yr exp in job offd or related occupation. 40 hr/wk. $81,016/yr. Mail resume to CO Dept of Labor & Emp. Attn: Jim Shimada, Tower 2, Suite 400, 1515 Arapahoe, St., Denver, CO 80202-2117, ref to JO# CO 5005973.

Programmer-Analyst. Design, develop and implement Internet based app. software using Oracle, Unix, Windows NT, DB2, IMS in multi-user environment. 2 yrs exp in job off'd to 2 yrs exp as Programmer with some duties and S.S. in Comp. Sci., Appl'd Math or related. Salary: $62K/yr. Exp. Ref. Req'd. EOE. Send resume to: DSI, 700 Taylor Rd, Suite 150, Gahanna, Ohio 43230.

IT Professionals needed. Flower Mound, TX company has senior level positions available for qualified candidates possessing MS degree or equivalent and relevant work experience. Work with 3 of the following: XML, COM+, DCOM, Authorize.Net, and Web Authorize E-Commerce Packages. Experience in developing E-Commerce applications for extended warranty provider, interfacing the E-Commerce applications with native AS/400 applications and DB2/400 data. Oracle 9i, and SQL Server 2000. Send resume to Domintech LLP, 5400 Shiretown Lane, Flower Mound, TX 75022.

# MAKE YOUR OLD JOB JEALOUS.

Few companies see the full scope of the contribution IT can make to their business. Fireman's Fund, a leading insurance company, will actively empower you to make that difference. Our Shared Services infrastructure positions you to make decisions with a tangible impact on the profitability of technological solutions. We'll give you the accountability you crave and inspire you to make the most of it – with lucid guiding principles, energized co-workers, and exceptional rewards. With your commitment, and that of our global parent, Allianz AG, there's nothing we can't accomplish.

## Project Manager

www.firemansfund.com/careers/ita2.html

Typical responsibilities for Project Managers at Fireman's Fund include: managing multiple IT projects such as business applications, architecture, data marts, operational data stores and infrastructure; managing and mentoring your people, taking responsibility for the complete project lifecycle from developing tactical and strategic approaches to cost/benefit analysis and risk assessment. Strong negotiation and influencing skills will be key to working successfully with sponsors, business leaders, functional managers, IT development teams and vendors. You'll also need experience defining roles and responsibilities, allocating resources, resolving conflicts and managing change. Proficiency in the IT project methodology life cycle is a must, while application development and commercial industry experience is strongly desired. Please visit www.firemansfund.com/careers/ita2.html for more information on our current opportunity in Novato, CA.

Employees enjoy innovative benefits including professional development opportunities, paid leave accounts, a matching 401(k) program and retirement benefits. Fireman's Fund is an Equal Opportunity Employer, M/F/D/V

Fireman's Fund®

Advertising Supplement

# IT Careers in Data Warehousing

**It's great to be able to collect all that data about customers and suppliers, delivery schedules and invoices. However, if the data can't be related and put in a context that does more than review – that enables decisions and helps forecast and predict – then the data isn't very valuable.**

That's the concept behind NCR's **Teradata** product. Its **Teradata** division is pushing the envelope of data warehousing technology to assist businesses with actively collecting and analyzing data. Vickie Farrell, vice president of **Teradata** Database Marketing, a division of **NCR**, says the **Teradata** product originally was released in 1984. "The field of relational database technology is every bit as exciting today as it was 20 years ago," says Farrell. "We have an innovative approach to dealing with heavy duty analytics. We're applying this in ways not even dreamed of back in '84."

Farrell says future trends call for companies to think about data in deeper and more interconnected ways, moving toward an active function that provides up-to-date information that can be used to serve customers ve creating static reports that summarize what happened in the past. "We need to integrate the data across an organization. For instance, in retail you don't want to separate store and catalog transactions from web-based transactions. It's important to have all the data to be able to see the trends.

"Another example is that in selling some major system or product, a sales rep may think the customer is good because he buys a lot. The finance group may think the customer is valuable because payments come in on time. And the service department may know the customer is costing more than the account value. However, no one has a complete understanding of the customer's value. This centralized warehouse approach for database management provides by far a higher level of success," explains Farrell.

In addition to groundbreaking work in the area of database management and warehousing, **Teradata** offers a "great employment opportunity," according to Farrell. "Talented people join our team to help solve our customers' problems, and then we do what it takes to help our customers be more successful. That's why this company has survived for the last 116 years." The **Teradata** division employs individuals worldwide in software engineering, sales, marketing, finance and support. "At **Teradata** there is a culture of information sharing and problem solving that drives innovation."

careers

For more job opportunities with data warehousing firms, turn to the pages of ITcareers.

- If you'd like to take part in an upcoming ITcareers feature, contact Janis Crowley, 650.312.0607 or janis_crowley@itcareers.net
- Produced by Carole R. Hedden
- Designed by Aldebaran Graphic Solutions

*Technology Can Change In The Blink Of An Eye*

**Technical & Senior Systems Engineers**

Bank of America seeks experienced IT professionals with Bachelor's and/or Master's degrees in Computer Science or related fields for Senior Applications and/or Senior Systems Engineering positions for e-Commerce development and web technology projects. Experience in UNIX, C++, Java and object oriented design required. Locations include Charlotte, NC, New York, San Francisco, Jacksonville, FL, Phoenix, AZ, Chicago, Dallas and Atlanta.

Bank of America offers one of the most competitive benefits packages in the industry for eligible associates which includes: 401(k) and pension programs, medical, dental, vision, and life insurance, child care assistance, tuition reimbursement, and stock options as well as time off benefits.

Please forward your resume and include **JOB CODE: CW01-0012771** to fax (800) 621-6177 or mail to Bank of America, NC1-021-03-13, 401 N. Tryon St., Charlotte, NC 28255. Email: careers@bankofamerica.com. Bank of America is an Equal Opportunity Employer. M/F/D/V.

www.bankofamerica.com

FORTUNE BEST COMPANIES FOR WORKING MOTHERS BLACKS

**Bank of America.**

IT PROFESSIONALS NEEDED

Programmer Analysts, Systems Analysts, Systems Engineers, Software Development. Digital GlobalSoft Limited (formerly Digital Equipment (India) Ltd.) is a leading software company with offices nationwide. With Digital you will get: Extensive Benefits, Additional Compensation for referrals and Professional Challenges with training and assignments to keep you at the leading edge of technology. We need people with the following skills:

OS: Open VMS, NT/Windows 2000, Tru 64Unix.

Language /Tools: ASP, Com/Dcom, Java Script, VB Script, VB, VC++, PERL, Java, EJB, CORBA, RMI, C/C++, DEC Forms, ACMS, Rally.

Middleware: MSMQ, TUXEDO.

Database: Oracle, SQL Server, Sybase and Rdb.

Travel to anticipated job sites throughout the United States required. Applications can be sent to: North America F & A Manager, Digital Equipment (India) Ltd., 334 South Street, SHR 3-2/C6, Shrewsbury, Massachusetts 01545.

Digital GlobalSoft Limited is an equal opportunity employer.

C3i inc. sales force automation support, training and professional services company has an opening for a Project Manager in Morristown, NJ to develop & implement Siebel Implementation projects. MS/BS in Comp Sci or Engg or Business with relevant work exp reqd. Send resume to: Michael Paul Williams, C3i Inc., 89 Maiden Lane, NY, NY 10038.

NEED TO HIRE. START WITH US.

# We Do a Better Job At

# Helping You Get One.

careers.com

What matters most: the size of the city you work in or the size of the network you work on?

Your resume knows the answer. Not only do we have one of the largest privately owned computer networks in the country, *Computerworld* considers us one of its "100 Best Places to Work." Add excellent pay and benefits, a diverse workplace, a balanced lifestyle, huge possibilities for personal advancement and you'll soon realize that bigger is better. Even if it is in a smaller city.

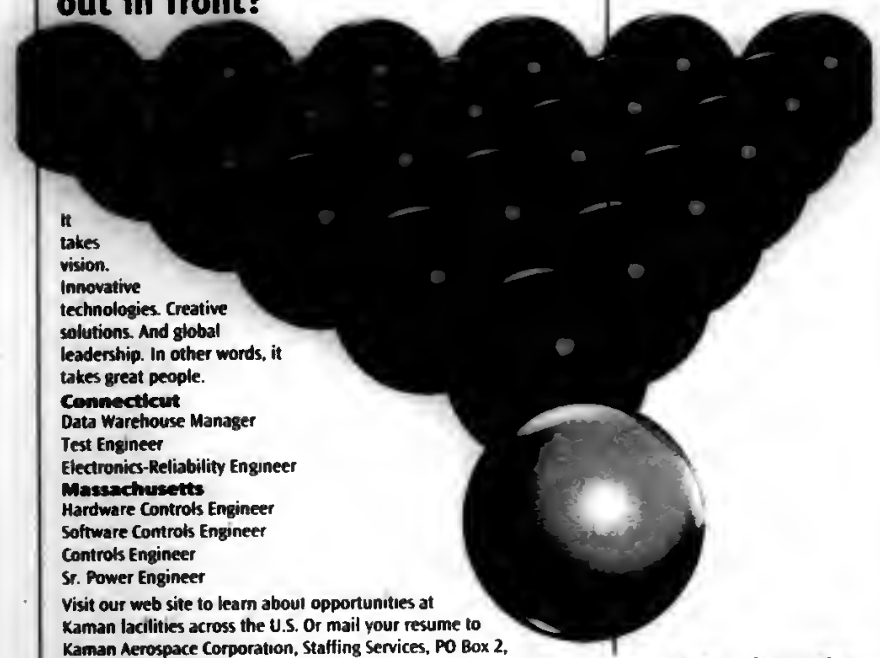
Contact State Farm Human Resources at **jobopps.corpsouth@statefarm.com** for information about current positions. Or visit our website at **statefarm.com**.™

STATE FARM INSURANCE

**Get there with State Farm.**

State Farm Insurance Companies • Home Offices: Bloomington, Illinois
An Equal Opportunity Employer

## What does it take to remain out in front?



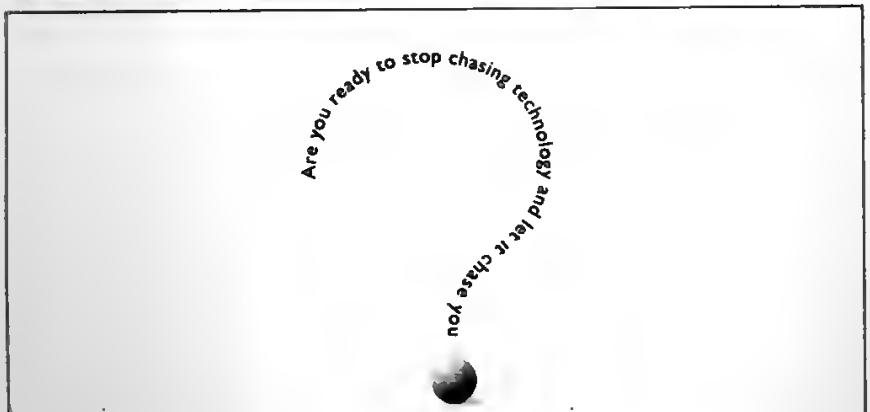
It takes vision. Innovative technologies. Creative solutions. And global leadership. In other words, it takes great people.

**Connecticut**
Data Warehouse Manager
Test Engineer
Electronics-Reliability Engineer

**Massachusetts**
Hardware Controls Engineer
Software Controls Engineer
Controls Engineer
Sr. Power Engineer

Visit our web site to learn about opportunities at Kaman facilities across the U.S. Or mail your resume to Kaman Aerospace Corporation, Staffing Services, PO Box 2, Bloomfield, CT 06002.
www.kamanaero.com
EEO/AAP/M/F/D/V

Kaman Aerospace Corporation
KAMAN




If you're an IT professional who's tired of playing industry catch up and want to get ahead of the game, look to Ajilon. As a frontrunner of information technology services, our people are always in demand. Our clients span a wide variety of industries so you'll benefit from a challenging, varied environment. And with a steady flow of new projects you'll have the stability that many consultants dream of. At Ajilon we don't just invest in technology, we invest in people. Visit us on the web at www.ajilon.com. You'll see we're taking information technology into the future. And we'd like to take you with us.

AJILON. | www.ajilon.com
The human side of information technology.
An equal opportunity employer

Just point your mouse to the world's best IT careers site.

Brought to you by Computerworld, InfoWorld and Network World.

Find out more. Call your ITcareers Sales Representative or Janis Crowley, 1-800-762-2977

IT careers.com

**Where the best get better**

# THE WORLD OF WORK IS CHANGING EVERY WEEK.

# LUCKILY, WE ARE TOO!

For the most up to date opportunities and coverage, stay tuned in with us.

IT CAREERS

**where the best get better**

**1-800-762-2977**


**Faculty Positions in the Area of Telecommunications and Networking**
**Purdue University**

Purdue University's Department of Computer Technology invites applications for four or more tenure-track, assistant professor positions at its West Lafayette home campus and various statewide outreach campuses beginning in January 2002. The department's mission focuses primarily on teaching, educational scholarship (not basic or applied research), and industry/professional outreach. Two West Lafayette positions exist in the area of telecommunications and networking, one focusing on network administration and management, another focusing on wireless applications with an opportunity to design and setup a new lab. Another West Lafayette position is in the area of software development using Java, Visual Basic and web scripting languages for object oriented, component-based Internet, and client/server information systems with some database experience desirable. West Lafayette candidates must participate in both undergraduate and graduate education assignments. Candidates for statewide outreach positions should be able to teach a variety of foundation courses in end-user computing, application programming, database systems analysis and design and data communications. All candidates must have an earned Masters Degree in a relevant field (the doctorate is not a requirement for employment, promotion, or tenure for these positions). All candidates should have at least three years of full-time, relevant, industrial experience in information systems and business computing. Prior teaching experience is also preferred. Applications will be accepted until the position is filled. Send a detailed resume and academic transcripts to CPT Search and Screen Committee, Ad Code IE, Department of Computer Technology, Purdue University, 1421 Knoy Hall 242, West Lafayette, IN 47907-1421. Questions should be directed to Professor Jeffrey L. Whitten (West Lafayette) at phone (765) 494-4545, or on the Internet at jlwhitten@tech.purdue.edu. Purdue University is an equal opportunity, affirmative action employer.


**The Job Seeker's Knockout Punch!**

Platinum Sponsors: IDG RECRUITMENT SOLUTIONS, YAHOO! CAREERS
Gold Sponsor: MERCK
Silver Sponsor: VERIZON WIRELESS
Bronze Sponsor: VERIZON

NAACP DIVERSITY CAREER FAIR
"The #1 Diversity Career Fair In The Nation"

**Meet face-to-face with the area's hottest companies and land a job with more money, opportunity & challenge!**

**2001-2002 UPCOMING SCHEDULE OF EVENTS**

| | | | |
|---|---|---|---|
| CHICAGO, IL | ST LOUIS, MO | MIAMI, FL | WASHINGTON DC |
| [illegible] | [illegible] | [illegible] | [illegible] |
| PHOENIX, AZ | NEW YORK | LOS ANGELES, CA | COLUMBIA, MD |
| Monday Nov 5 | [illegible] | Monday Jan 22 | [illegible] |

**CALL 1-800-562-7469 FOR MORE INFORMATION ON EXHIBITING OR ATTENDING!**
Or check out www.naacpcareerfair.com to find out more about these events and other career opportunities.

The NAACPDiversity Career Fair is produced and managed by Shamex
2601 Ocean Park Boulevard, Suite 200 • Santa Monica, CA 90405 • (310) 450-0831


Multiple openings for permanent Programmer Analyst/Quality Assurance/Test Engineers/Database Administrators/System or Network Engineers/Business Analyst/Software Engineer positions from entry to senior level throughout the US. Will design, develop, program and test business applications, enterprise systems, networks and computer systems involving TPF, sales force automation, data warehousing, business metrics, E-commerce, Internet/Web applications, and others using object oriented design and development, relational database modeling, distributed systems, and current Web technologies. Particular tools include one or more of: JAVA, C/C++, Visual Basic, ASP, ActiveX, UNIX, SQL, SAP, Windows NT, Lotus Notes, Perl, COBOL, IMS, CICS, DB2, TPF, Assembler, CORBA, HP/UX, COM/DCOM, OLE, CGI, Internet protocols and others. B.S. in Computer Science, Engineering, Math or related area. Will accept combination of education, training and experience in lieu of degree. Prior experience and M.S. required for some positions. Competitive salary/401(k)/benefits offered. Most active locations include: Atlanta, GA; Bloomington, MN; Chicago, IL; Colorado Springs, CO; San Francisco, San Jose, CA; Durham, NC; Ft. Lauderdale, FL; Hunt Valley, MD; Madison, WI; Miami, FL; Minnetonka, MN; Minneapolis, MN; Fairfax, Herndon and Richmond, VA; St. Louis, MO and Winston-Salem, NC. Send resume to: IntelliMark, 701 Emerson Road, Suite 445, St. Louis, Missouri 63141, Attn: Carol King

Manager Customer Tech Services-Latin America. Responsible to manage communications with subsidiaries and distributorships located throughout Latin America. Act as a liaison between the customers in Latin America and company product planning processes in US. Monitor technical support issues managing the resolution of complex technical issues. Develop special technical training programs for technology products including PROGRESS 4GL, Java, HTML, Actuate and CorVu Software. Train staff in sales/support throughout Latin America. Bachelor's degree CS/Engineering/Math or related and two years of experience in the job offered or as a Tech. Accts. Man./Tech. Supp. for/in Latin America. Position based in Boca Raton, FL. Fluency in Spanish. Contact C. Ward, Progress Software, 14 Oak Park, Bedford, MA 01730 or FAX resume to 781-280-4035.

Multiple openings for IT professionals with industry exp. in MTS, Three-Tier, SQL Server 7, OOP, Pro*C, C/C++, Visual Interdev, Jscript, etc. reqd. Some positions require MS or equiv. CS, Electrical/Electronics/Power/Comp. Engg. or rel. field. Others require BS or equiv. as above. Pay matching with exp. Foreign educ. equiv. &/or combination of educ/exp. accepted. Travel/relocation reqd. Resume only to Master Minds, Inc., 1780 Century Circle, Ste. #2, Atlanta, GA 30345.

## IT Opportunities

SignalTree Solutions is an established international IT solutions and services company. We provide our employees with a competitive compensation package and an excellent benefits package.

Currently SignalTree Solutions has multiple openings at our corporate office in Irvine, California, Chicago, Illinois and Jacksonville, Florida for the positions referenced below:

Software Engineer
Sr. Software Engineer I
Sr. Software Engineer II
Project Manager
Project Leader I
Project Leader II
Technical Architect

Please send a letter of introduction (indicating position of interest) along with resume, salary history and requirements to:

**SignalTree Solutions,**
**Attn: L. Berdakjian,**
**CW1015,**
**133 Technology Drive,**
**Suite 200,**
**Irvine, CA 92618.**
**Fax: (949) 450-4601.**
**Email: lb.resume@SignaltreeSolutions.com**

EOE

SignalTree

Network Solution Sales & Support Specialist. Design & develop software solutions to resolve problems. Design & configure network software or network software expansion to perform software applications. Oversee & monitor development of multimedia on-site network systems installations, configuration of new software systems to meet specific needs of customers in Latin America. Design, install & provide technical support for multimedia (CDROM) network systems designed to interface with telephone & digital sound & video systems. Determine compatibility of new software with existing systems. Negotiate & coordinate sales or network systems & compatible products to customers in Latin America. 40 hrs./wk., OT as needed, 9-5, $41,000 p/yr. Reqd. BA in Comp. Science or Foreign Equivalent, 2 yrs. exp. either in job offered or as sales engineer for software solution programs. Send resume only to: Workforce Program Support, PO Box 10669, Tallahassee, FL 32302. Refer to FL-2203524.

Marketing & Distributor of CDROM Software seeks Software & Network Support Manager-Brazil & South America. Will provide tech network support to sales staff at branch office in Brazil & to customers in South America. Respond to customers calls in Brazil & South America effectively communicate with customers to determine need of support, articulate & configure error/problem in software/hardware by means of customer dialog, remote dial-in or in-house reproductions. Require frequent travel to meet with customers. BS in Computer Technology or Foreign Degree Equivalent. 5yrs. of experience either in job offered or as tech specialist for computers & electronic equipment. Send resume only to: Vidal Santos, PC-Home Entertainment Corp, 3563 NE 82nd Ave, Miami, FL 33122.

# How to Contact Computerworld

### TELEPHONE/FAX

**Main phone number** (508) 879-0700
*All editors unless otherwise noted below*
**Main fax number** (508) 875-8931
**24-hour news tip line** (508) 620-7716

### E-MAIL

Our Web address is **www.computerworld.com.** All staff members can be reached via e-mail using the form: **firstname_lastname@computerworld.com.**

All IDG News Service correspondents can be reached using the form: **firstname_lastname@idg.com.**

### LETTERS TO THE EDITOR

Letters to the editor are welcome and should be sent to: **letters@computerworld.com.** *Include your address and telephone number*

### MAIL ADDRESS

**PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701**

### SUBSCRIPTIONS/BACK ISSUES

Subscription rates: U.S., $68/year; Canada, $110/year; Central and South America, $250/year; all others, $295/year

**Phone** (800) 552-4431
**E-mail** circulation@computerworld.com
**Back issues** (508) 820-8167

### REPRINTS/PERMISSIONS

**Phone** Ray Trynovich (717) 399-1900, ext. 124
**E-mail** rtry@rmsreprints.com

### CONTACTING CW EDITORS

We invite readers to call or write with their comments and ideas. It is best to submit ideas to one of the department editors and the appropriate beat reporter.

**Editor in Chief** Maryfran Johnson (508) 820-8179
**Editorial Director, Print/Online** Patricia Keefe (508) 820-8183

### DEPARTMENT/BUREAU EDITORS

**News Editor** Don Tennant (508) 620-7714
**Assistant News Editor** Craig Stedman (508) 820-8120
**Business Editor** Thomas Hoffman (845) 998-9630
**Technology Editor** Tommy Peterson (508) 820-7729
**IT Careers Editor** David R. Weldon (508) 820-8166
**Washington Bureau Chief** Mitch Betts (202) 737-6049
**West Coast Bureau Chief** Penn Fox (650) 524 7116

### REPORTERS

**Mobile computing/wireless; health care** Bob Brewin (301) 277-8069
**Internetworking; telecom; Novell** James Cope (219) 273-5369
**Application development; Java; large systems; automotive** Lee Copeland (773) 278-0234
**General assignment; e-mail; groupware; travel** Jennifer DiSabatino (508) 820-8122
**Financial services; storage; IT management** Lucas Mearian (508) 820-8215
**Public B2B; online procurement; middleware; network systems mgt.** Michael Meehan (508) 820-7704
**General assignment; intel servers; transportation/logistics** Linda Rosencrance (508) 626-4734
**Microsoft; retail industry** Carol Sliwa (508) 626-4731
**ERP; supply chain; CRM; database; data warehousing; CA** Marc L. Songini (508) 820-8182
**State/federal government; antitrust; legal issues; politics** Patrick Thibodeau (202) 737-8081
**Security; defense and aerospace** Dan Verton (703) 321-2277
**ASPs/outsourcing; disaster recovery; security; heavy manufacturing** Jaikumar Vijayan (508) 820-8220
**General assignment; Linux and Unix operating systems** Todd Weiss (717) 560-9255

### OPINIONS

**Senior News Columnist** Frank Hayes (503) 252-0100
**Columns Editor** Rick Saia (508) 820-8118

### FEATURE EDITORS

**Special Projects Editor** Ellen Fanning (508) 820-8204
**Editor at Large** Mark Hall (503) 391-1156
**Reviews** Russell Kay (508) 820-8175
**Special Projects Editor** Julia King (610) 532-7599
**Technology Evaluations Editor** Robert L. Mitchell (508) 820-8177

### FEATURE WRITERS

Gary H. Anthes (202) 737-7242
Matt Hamblen (508) 820-8567
Sami Lais (301) 270-1427
Kathleen Melymuka (508) 628-4931
Kim S. Nash (773) 275-4133
Deborah Radcliff (707) 829-5823
Melissa Solomon (508) 620-7754

### COMPUTERWORLD.COM

**Director, online and design** Tom Monahan (508) 820-8216
**Managing editor/online** Sharon Machlis (508) 820-8231
**Online news editor** Ken Mingis (508) 820-8545
**Online news editor** Marian Prokop (508) 620-7717
**Communities director** Vanessa DiMauro (508) 820-8110
**Communities senior editor/writer** Rich Saia (508) 820-8118
**Custom/site page editor** Brian Sullivan (508) 620-7760
**Communities builder** Barbara Sternberg (508) 620-7762
**Associate art director** David Waugh (508) 820-8142
**Associate art director** John R. Brillon (508) 820-8216

Keeley Guillonne, **marketing associate/researcher**; Peter Smith, **Web development manager**; Kevin Gench, Mark Savery, **Web developers**; Bill Rigby, **associate Web developer**; David Ramel, **online production coordinator and e-mail newsletter editor**; Christopher Gibbons, **senior Web designer**; Matthew Murray, **graphic designer**

### RESEARCH

Mari Keefe, **research manager**; Allison Wright, **research associate**; Gussie Wilson, **research assistant**

### COPY DESK

Jamie Eckle, **managing editor/production** (508) 820-8202; Jean Cavallivo, **assistant managing editor/production**; Michele Lee, Bob Rawson, **senior copy editors**; Jacqueline Day Eugene Demaitre, Mike Parent, Monica Sambataro, **copy editors**

### GRAPHIC DESIGN

Stephanie Faucher, **design director** (508) 820-8235; Mitchell J. Hayes, **art director**; April O'Connor, **associate art director**; Julie D'Errico, **graphic designer**; Susan Cahill, **graphics coordinator**; Rich Tennant, John Klossner, **cartoonists**

### ADMINISTRATIVE SUPPORT

Linda Gorgone, **office manager** (ext. 8175); Lorraine Witzell (ext. 8136), Cheryl Dudek (ext. 8178)

### CONTRIBUTING COLUMNISTS

Joe Auer, David Foote, Michael Gartenberg, Dan Gillmor, Thornton A. May, David Moschella, Nicholas Petreley, Fran Quittel, Paul A. Strassmann

### CONTRIBUTING WRITERS

Kevin Fogarty, Leslie Goff, Amy Helen Johnson, Mathew Schwartz

## COMPANIES IN THIS ISSUE

*Page number refers to page on which story begins. Company names can also be searched at* **www.computerworld.com**


3WAY INC 48
ABERDEEN GROUP INC 20,59
ABN AMRO NORTH AMERICA INC 20
ACER AMERICA CORP 20
ADVANCED MICRO DEVICES INC 14
AEROSPACE INDUSTRY ASSOCIATION OF AMERICA INC 14
AGATE TECHNOLOGIES INC 64
AMDOCS LTD 20
AMERICA ONLINE INC 70
AMERITECH CORP 70
AMERITRADE HOLDING CORP 64
AMR RESEARCH INC 20
ANDERSEN WORLDWIDE 20
APTECH LTD 7
ARIBA INC 20
ASAP CO 70
BAIN CAPITAL INC 0
BALTIMORE TECHNOLOGIES PLC 20
BANK OF HAWAII 0
BAXTER INTERNATIONAL INC 1
BERO SOFTWARE DESIGN 20
BMC SOFTWARE INC 64
BOOLE & BABBAGE INC 64
BROCADE COMMUNICATIONS SYSTEMS INC 38,58
BTRADE INC 18
BURLINGTON NORTHERN SANTA FE CORP 20
CABLE & WIRELESS PLC 18
CALIFORNIA TECHNOLOGY 64
CANADIAN PACIFIC LTD 10
CAPITAL ONE FINANCIAL CORP 20
CARNELL INC. 20
CARNEGIE MELLON UNIVERSITY 6
CASCADE WORKS INC 20
CELERA GENOMICS CORP 20
CERT COORDINATION CENTER 6
CHARLES SCHWAB & CO 20
CHILISOFT 64
CIA 6
CISCO SYSTEMS INC 12,43
CLARIFY INC 20
CLARK RETAIL ENTERPRISES INC 0
CLARUS CORP 20
CLEAR COURSE INC 7
CLIFFORD CHANCE ROGERS & WELLS 6
COMMERCE ASSOCIATES INC 64
COMERICO INC 5,78
COMMERCE ONE INC 14,28
COMMUNICATIONS TECHNOLOGY SYSTEMS INC 64
COMPAQ COMPUTER CORP 1,10,18,38,54,76
COMPUTER ASSOCIATES INTERNATIONAL INC 10,38
COMPUTER SECURITY INSTITUTE 6
CONSOLIDATED EDISON COMPANY OF NEW YORK INC. 1
CONVERSUS GROUP LLC 20
CORPORATION FOR PUBLIC BROADCASTING 7
COWARTON & BURLING 38
DATACORE SOFTWARE CORP 38
DATAPHILE CONSULTING 44,46
DEFENSE INVESTIGATIVE SERVICE 6
DELL COMPUTER CORP 1,52,78
DEPAUL UNIVERSITY 1
DICE INC 64
DIGITAL EQUIPMENT CORP 20
DOUBLETWIST INC 64
DOWNEY SAVINGS AND LOAN ASSOCIATION FA 7
DNC CORP 32,52
EMPRESAS POLAR 1
EVANS & CHRISTIAN CONSULTING LLP 10
FAIRMONT HOTELS & RESORTS INC 10
FTB 6,7
FEDERAL COMMUNICATIONS COMMISSION 24
FEDERAL RESERVE BANK 7
FEDERATION OF AMERICAN SCIENTISTS 6
FERRIS RESEARCH 20
FOX FILMED ENTERTAINMENT 64
FREEMARKETS INC 20
GARTNER INC 1,7,18,28,50,70,74,58
GIGA INFORMATION GROUP INC 28
GLOBAL CHANNEL SOLUTIONS INC 64
GOODRICH CORP 14
GROOVE NETWORKS INC 28
GTE CORP 78
HAYES COMMUNICATIONS INC 78
HEWLETT-PACKARD CO 1,6,10,32,38,48,52,64
HOCHTIEF AG 1
HOMEPORT FOLIO INC 54
HURWITZ GROUP INC 28
I2 TECHNOLOGIES INC 6
IBM 12,14,32,36,43,44,64,54,60,62,78
IDC 18,28,30
ILLUMINATA INC 48
INFOCROSSING INC 1
INFORMATION TECHNOLOGY ASSOCIATION OF AMERICA 6
INFORMED BEVERAGE MANAGEMENT INC 18
INFORMIX CORP 78
INSURANCE SERVICES OFFICE INC 64
INTEL CORP 10,38
INTERACTIVE SOFTWARE ENGINEERING 12
INTERNET ENGINEERING TASK FORCE 28
INTERPACT INC 6
IOMEGA CORP 64
J.D. EDWARDS & CO 1,12
KAISER ALUMINUM & CHEMICAL CORP 1
KAMAN CORP 12
KINKO'S INC 38
KITCHELL CORP 1
LANE 9 SOFTWARE INC 64
LEGATO SYSTEMS INC 38,52,54
LENTZ COMPUTER SERVICES 1
LOCKHEED MARTIN CORP 12
LOCKHEED MARTIN 6
ENTERPRISE INFORMATION SERVICES 58
LOTUS SOFTWARE GROUP 28,60
MANAGESTORAGE INTERNATIONAL INC 64
MANAGEMENT SYSTEMS DESIGNERS INC 1
MCDR LLC 1
MCDATA CORP 36,52
MELLANOX TECHNOLOGIES LTD 48
MERIDEN RESEARCH INC 20
MERRILL LYNCH & CO 54
META GROUP INC 14,28
MICROSOFT CORP 1,8,10,12,16,28,60,78
MINTZ LEVIN COHN FERRIS GLOVSKY AND POPEO PC 6
MONTGOMERY WARD LLC 10
MOTOROLA INC 28
MP3.COM INC 32
M-SYSTEMS-FLASH DISK PIONEERS LTD 28
MTI TECHNOLOGY CORP 32
NASA 12
NASDAQ STOCK MARKET INC 20
NATIONAL ACADEMY OF ENGINEERING 6
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION 28
NETCRAFT LTD 28
NETSCAPE COMMUNICATIONS CORP 28
NETWORK ASSOCIATES INC 14
NIAGARA MOHAWK POWER CORP 1
NISHAN SYSTEMS INC 28
NORTEL NETWORKS CORP 28
NORTHEAST UTILITIES SERVICE CO 1
NOVELL INC 44,54
NPD INTELLECT MARKET TRACKING 16
OFFICE DEPOT INC 10,38
OPEN APPLICATIONS GROUP INC 14
ORACLE CORP 38,50,78
PALM INC 18,78
PRICEWATERHOUSECOOPERS 32
PROVIDIO TECHNOLOGY GROUP LLC 7
QUINTILES TRANSNATIONAL CORP 10
RADIO SHACK CORP 28
RESEARCH IN MOTION LTD 8
ROSETTANET 14
ROYAL DUTCH/SHELL GROUP OF COMPANIES 12
RSA SECURITY INC 14
SANNYALATOR INC 64
SAP AG 12,14,78
SATYAM COMPUTER SERVICES LTD 7
SEQUENT COMPUTER SYSTEMS INC 78
SHELL INFORMATION TECHNOLOGY INTERNATIONAL BV 12
SIEBEL SYSTEMS INC 78
SOFTWARE & INFORMATION INDUSTRY ASSOCIATION 6
SOLUTIONARY INC 6
SPRINT CORP 78
SSA GLOBAL TECHNOLOGIES INC 78
STORABILITY INC 28
STORAGE NETWORK INDUSTRY ASSOCIATION 28
STORAGE TECHNOLOGY CORP 64
STORAGENETWORKS INC 58
SUFFOLK UNIVERSITY LAW SCHOOL 6
SUN MICROSYSTEMS INC 12,14,28,32,36,48,50,52
SUNGARD DATA SYSTEMS INC 6
SYBASE INC 36
SYMANTEC CORP 78
SYMBOL TECHNOLOGIES INC 18
SYQUEST INC 78
TEAC AMERICA INC 28
TECHIES.COM INC 28
TELECHOICE INC 28
TERACLOUD CORP 28
TEXAS PETROCHEMICALS LP 1
THE BOEING CO. 14,60
THE CENTER FOR STRATEGIC & INTERNATIONAL STUDIES 24
THE ENTERPRISE 1
STORAGE GROUP INC 38,48,52
THE FULMER GROUP 1
THE GOLDMAN SACHS GROUP INC 24
THE HOME DEPOT INC 1, 28
THE NEWS CORP 64
THE SANTA CRUZ OPERATION INC 28
TOSHIBA AMERICA ELECTRONIC COMPONENTS 64
TOWERS/GROUP 20
TRANSMETA CORP 28
TRENSTOR USA INC 64
TRELLISOFT INC 28
TRILLIANT GROUP 44
TRUSECURE CORP 28
U.S. DEPARTMENT OF COMMERCE 24
U.S. DEPARTMENT OF DEFENSE 6,24
U.S. DEPARTMENT OF JUSTICE 6
U.S. POSTAL SERVICE 10
UNITED SPACE ALLIANCE 12
UNIVERSITY OF NEVADA, LAS VEGAS 10
UNIVERSITY OF UTAH 28
UNN INTERNATIONAL 78
USINTERNETWORKING INC 6
VERIO INC 28
VERITAS SOFTWARE CORP 38,52
VITRIA TECHNOLOGY INC 14
VOLKSWAGEN AS 64
W. QUINN ASSOCIATES INC 64
WEBGAIN INC 18
WEBMD CORP 10
WESTERN DIGITAL CORP 64
WILLIAM BLAIR & CO 18
YAHOO INC 64
YANTRA CORP 6
ZAMBEEL INC 28


### ADVERTISERS INDEX


ASPECT www.aspect.com .21
AT&T www.att.com 30-31
BrainStorm Group www.brainstorm-group.com 24
Brocade www.brocade.com 45
Cisco www.cisco.com 15
Compaq Computer Corp www.compaq.com 11
Computer Associates www.ca.com 4
DataCore Software www.datacore.com 57
Dell www.dell.com 29
EDS www.eds.com 53
Executive Software www.executivesoft.com 17
Hewlett-Packard www.hp.com 40-41
IBM Webmaster www.ibm.com ...53
IBM Lotus Notes www.lotus.com/wirelessnotes 55
Inprise www.inprise.com 47
LSI Logic www.lsilogicstorage.com 65
Mantix www.mantor.com 34
McData www.mcdata.com 68
Microsoft MSDN www.microsoft.com 2-3
Microsoft Project www.microsoft.com 26-27
Oracle Corp www.oracle.com 9
Princeton Softech www.softechinc.com 67
RSA Security www.rsasecurity.com 13
Samsung www.samsung.com 79
Stellent www.stellent.com 25
StorageTek www.StorageTek.com 39
Sun Microsystems www.sun.com 22-23, 60
Sybase www.Sybase.com 19-19
Symantec www.symantec.com 61
Veritas www.veritas.com 51


This index is provided as an additional service. The publisher does not assume any liability for omission or errors.

*Continued from page 1*

## Licensing

Oct. 1 eliminatioo of the version upgrade program, which was cheaper for many.

"It doesn't signify to us that they're changing their strategy, just that they're delaying," said Joseph Aivano, an IT director for the regulated utility group at Northeast Utilities Service Co. in Berlin, Conn. "I see [the announcement] as a significant negative and a retrenching as to how they can market this strategic change."

Microsoft CEO Steve Ballmer acknowledged, during last week's Gartner Inc. Symposium/ITxpo 2001 in Orlando, that his company had "heard loud and clear, 'You will change some things.' "

Microsoft responded by extending for the second time the deadline to sign up for the licensing program it unveiled five months ago. It will also continue to make available through July 31 its Upgrade Advantage option, which gives access to all upgrades during the contract time.

Upgrade Advantage paves the way for customers to move to the new Software Assurance program, which Microsoft is trying to entice customers to adopt. Under Software Assurance, users gain the rights to upgrade to the latest available versioo of a prodoct as long as they pay 25% of the license fee for any server package and 29% of a desktop product's price on an annual basis.

Microsoft, in turn, gets a more steady, predictable revenue stream at a time when some customers have been upgrading less frequently.

To qualify for Software Assurance, a company must be using the current versioo of the software. But Microsoft last week announced that, through July 31, both the older Office 2000 and the current Office XP will be considered current for the purposes of enrolling in Software Assurance.

Ballmer said he doesn't expect any further program changes or deadline extensions, "because we've heard what people had to say."

"We've responded to it. I don't think we're going to hear aoy new arguments. So I think we're kind of done," he said.

But that prospect may not sit well with those users who are still grumbling about the new program. Alejandro Bombaci, CIO at Empresas Polar, a consumer goods manufacturer and distributor in Caracas, Venezuela, was clearly upset. "Nobody in the industry talks about 29% for maintenance," he said. "It's unheard of."

Ballmer defended the Software Assurance pricing, saying, "If you look at the dollars, everything about our prices are quite different than classic enterprise software."

> It really burns my buns to hear software vendors use the term *a fair price.*
>
> **JOHN MORGAN, IT MANAGER, TEXAS PETROCHEMICALS LP**

"If you can find a classic enterprise piece of software that sells for a few hundred dollars, then its maintenance, too, might have to be a little higher than the percent people think of as typical," Ballmer said. "I don't seriously propose it, but the way to get the percentage down would have been to raise the price of the original license, which I don't think anybody would have liked either. I think the Software Assurance price is a fair price."

That comment served only to raise the ire of John Morgan, an IT manager and technology architect at Texas Petrochemicals LP in Houston. Morgan said his company will stand pat with Windows NT 4.0, and he will consider switching to competitive products.

"It really burns my buns to hear software vendors use the term *a fair price*," Morgan said. "I heard it from Oracle, my ERP vendor and now Microsoft. Translated, it means, 'I would like to change the rules to increase my profitability at your expense.' "

Microsoft insists that the new program will simplify licensing, ease software administration, streamline the sales process and give customers more flexibility and choice, including a new subscription option.

Industry analysts have argued that Microsoft's decision to eliminate its version upgrade program takes away the least expensive option for customers. Gartner estimated that companies performing upgrades every four years could see costs soar 68% to 107% under Software Assurance.

Microsoft officials estimated that only 20% of purchases would end up costing more than they do now, because those customers upgrade less frequently than average. Microsoft predicted the vast majority of customers will see license costs stay the same or decrease.

Many users have complained that their prices are going up. But John Scannello, a consultant for IT planning at Consolidated Edison Company of New York inc., said his company generally upgrades every two years under its Upgrade Advantage, so the new Software Assurance program that be expects to sign soon will save it money.

*Continued from page 1*

## Certification

at the end of this year.

"Manna from heaven," was Drew Philip Halevy's reactioo to the news. Halevy, a customer service manager at MC2K LLC, an Internet service provider in Rogers, Ark., said he had considered abandoning the MCSE program, since he "did not want to be on a treadmill."

"I had also felt betrayed by Microsoft for cutting us loose," Halevy said. "I can now migrate to the MCSE [for Windows 2000] because I want to, not because I have to."

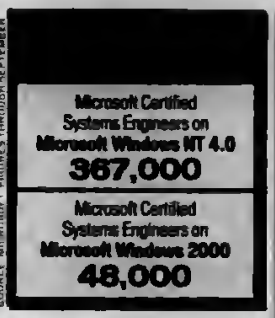
An MCSE for the newer operating system will now be formally referred to as "MCSE on Microsoft Windows 2000."

Larry Lentz, president and owner of Lentz Computer Services in San Antonio, said the new Windows 2000 designatioo "will be good, since that will set that certificatioo apart and make it more distinctive."

Microsoft last week also introduced a new credential, the Microsoft Certified Systems Administrator (MCSA), for those who manage and troubleshoot Windows 2000-based networks.

"I think the SA certification concept is good, because there's a lot of badly administered networks out there," said Brian Fulmer, founder of The Fulmer Group, a Visalia, Calif.-based firm that specializes in computer networks.

While users reacted positively to the Microsoft Certified Professional program changes, IT managers in hiring positions said experience remains the most important credential.




"It's one of those things [where] if a person has [the MCSE credential], everything else being equal, it makes a difference. But typically, it's not the deciding factor," said John Scannello, a consultant for IT planning at Consolidated Edison Company of New York Inc.

"I work on a team of six people, and everybody is certified except one. But I really don't base hiring on that," said Frank Orlow, manager of technical services at Clark Retail Enterprises Inc. in Oak Brook, Ill. "It's just a plus type of thing. Skills set and experience are more important to me."

To David Sanders, general manager of Management Systems Designers Inc. in Vienna, Va., the MCSE certification is important. His company is a certified Microsoft Solution Provider that does high-tech work for federal agencies.

Sanders said the extended certification is good for him oo a personal level, since moving from his MCSE for Windows NT 4.0 to Windows 2000 will be expensive and time-consuming. But as a manager, "it causes me some pause that those certified professionals out there may not be so motivated to keep their certifications current and upgraded," Sanders said.

Anne Marie McSweeney, director of certification and skills assessment at Microsoft, said the changes were made "to solve more customers' problems."

Quick Link See what readers are saying about the MCSE program, and post your opinion: www.computerworld.com/q?ai100

Quick Link What do you think? Visit our user forums: www.computerworld.com/q?ai1000

Periodical postage paid at Framingham, Mass., and other mailing offices. Posted under Canadian International Publication agreement #0388697. CANADIAN POSTMASTER: Please return undeliverable copy to PO Box 1632, Windsor, Ontario N9A 7C9. Computerworld (ISSN 0010-4841) is published weekly except a single combined issue for the last two weeks in December by Computerworld, Inc., 500 Old Connecticut Path, Box 9171, Framingham, Mass. 01701-9171. Copyright 2001 by Computerworld Inc. All rights reserved. Computerworld can be purchased on microfilm and microfiche through University Microfilms, Inc., 300 N. Zeeb Road, Ann Arbor, Mich. 48106. Computerworld is indexed. Back issues, if available, may be purchased from the circulation department. Photocopy rights, permission to photocopy for internal or personal use is granted by Computerworld Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $3 per copy of text article, plus $0 cents per page, is paid directly to Copyright Clearance Center, 27 Congress St., Salem, Mass. 01970. Reprints (minimum 100 copies) and permission to reprint may be purchased from Ray Trybnick, Computerworld Reprints, c/o Reprint Management Services, Greenfield Corporate Center, 1811 Olde Homestead Lane, Lancaster, Pa., 17601, (717) 399-1900 Ext. 124, Fax (717) 399-8900. Web site: www.rmsreprints.com. E-mail: rtrybnick@rmsreprints.com. Requests for missing issues will be honored only if received within 90 days of issue date. Subscription rates: $5 per copy; U.S. – $498 per year; Canada – $161 per year; Central & So. America $298 per year; Europe – $298 per year; all other countries – $298 per year. Subscriptions call toll-free (800) 962-4431. POSTMASTER: Send Form 3579 (Change of Address) to Computerworld, PO Box 912, Mount Morris, IL 61054-0912.

BPA ABM

FRANK HAYES/FRANKLY SPEAKING

# Why the Surprise?

MURCHNICK LOOKED LIKE HE WAS ON THE VERGE of tears, sitting in the Old Man's office. "Half of them!" he moaned. "Half of our suppliers will be gone in three years. Out of business. Kaput."

"I was in Orlando, Murch," said the Old Man calmly. "I heard the speech. But what are you worried about?"

"What are we going to do without Microsoft?" Murchnick said. "Or IBM or Dell or Oracle or SAP or Siebel? Or are you telling me this analyst brain trust is all wrong?"

"Oh, no," the Old Man said, leaning back in his chair. "I think they're probably right."

"What?" said Murchnick, his face reddening.

"They're right," the Old Man repeated. "Half of our big-name vendors will be merged or go bankrupt. Why not? We've pulled the plug on a lot of projects, and so has everyone else I've talked to. If we stop buying, that will put some vendors out of business. It's unpleasant, but it happens."

"But," said Murchnick, "how can you just sit there? This is terrible! Nothing like this has ever happened. If half our suppliers are gone . . . "

"Murch, do you remember Baan?" The Old Man said as he sat forward and tapped on his keyboard.

"Sure," Murchnick said. "They did that ERP demo for us last year. They're still in business, aren't they?"

"Yes, but only because they were bought out," the Old Man said. "You probably don't remember Boole & Babbage — we had some of their mainframe software. They were bought out, too. And Comdisco . . ."

"*They're* still in business," said Murchnick. "They were all over the news in September."

"They've been bankrupt since July," said the Old Man. "And you know Compaq bought Digital Equipment. And remember all those Hayes modems we used to give your salespeople to work from home? Bankrupt.

"IBM bought Informix. America Online bought Netscape. Symantec bought Quarterdeck — you remember them, you talked me into using their PC memory manager," the Old Man continued. "SCO was a Unix software vendor. Sequent made big Unix boxes with lots of processors. SSA made us a proposal for that same ERP project Baan didn't get."

"So?" Murchnick said.

"They're all gone," said the Old Man. "Bought out, mostly." He tapped the keyboard a few more times. "And SyQuest — they made those removable drives we ended up replacing with Zips. And Wang. Those are the ones I figured you'd recognize. They're all household names in IT, aren't they?"

"What are you looking at, anyhow?" said Murchnick.

"It's my old Rolodex," said the Old Man. "I haven't touched it since I got my Palm Pilot three years ago, so it's badly out of date. These were all big names in IT three years ago or so, Murch. Now they're all merged or bankrupt, just like the man said. And that isn't even counting all the telecom mergers — MCI and Sprint and GTE and Ameritech and US West. In one office or another, we had phone service with all of them. But not anymore."

"So . . ."

"So if we lost that many in the past three years, why wouldn't we expect to lose just as many in the next three?" the Old Man said.

"So," Murchnick said, "you're telling me there really isn't anything to worry about?"

"I'm telling you we've always got contingency plans, Murch," the Old Man said. "We have to, the way vendors come and go. In fact, there's only one thing that worries me about all those vendors that will merge or go under."

"What's that?" Murchnick asked.

"That anyone will be surprised." ▶

Frank Hayes, Computerworld's senior news columnist, has covered IT for more than 20 years. Contact him at frank_hayes@computerworld.com.

## SHARK TANK

**FOR A CHANGE** of pace, IT team leader pilot fish holds a meeting at picnic tables in the building's open-air atrium. "Attendees like the meeting environment and actively participate," says fish. Don't do it again, fish's boss tells him: "Outside meetings aren't productive – and they distract smokers using the atrium."

**DIRECTOR OF** new e-business initiative can't revive his sleeping laptop for a big presentation, so while it reboots, he entertains the decision-makers with a shadow-puppet show against the blank screen. Overheard by pilot fish after it's over: "The shadow puppets were more interesting than his presentation."

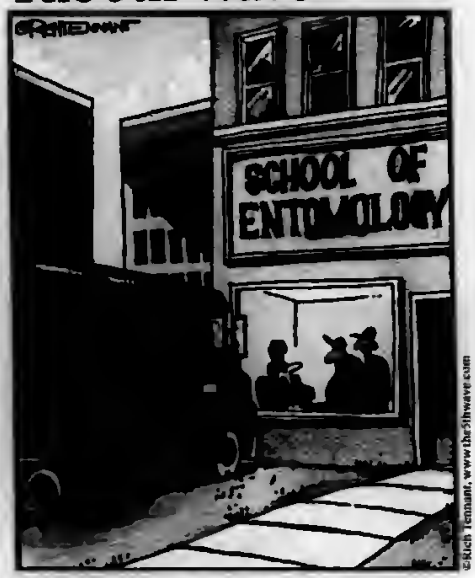
**PILOT FISH** gets an e-mail: "Please be advised that the workshop 'Organizing Yourself and Managing Your Time,' set for Nov. 23, has now been rescheduled for Nov. 6." Then another, 20 minutes later: "My apologies – the correct date for our time management workshop is Oct. 31. I trust this has not caused inconvenience for anyone." Grumbles fish, "And they're going to teach us to do what?"

**THIS PILOT FISH'S** company offers a tip for picking a secure password: "Try choosing combinations of easily remembered sequences. Example: Every third letter of last name, combined with every second letter of brother's first name, with last number of a friend's address in the middle." Puzzles fish, "That's a pretty liberal interpretation of 'easily remembered sequences'!"

**DETROIT-AREA** pilot fish spots job posting for an e-commerce manager: The right candidate "will be hands-on and will overlook projects and systems." Fish snickers, "I'd love to have a job where I can overlook projects."

Don't overlook me: **sharky@computerworld.com**. You get a sharp Sharp shirt if your true tale of IT life sees print – or if it shows up in the daily feed at *computerworld.com/sharky*.

## The 5th Wave




©Rich Tennant, www.the5thwave.com

"You'd better come out here – I've got someone who wants to run a banner ad on our Web site."

SAMSUNG

SEE, HEAR AND FEEL THINGS LIKE NEVER BEFORE
THE WORLD'S FIRST & LARGEST ①
24 INCH ULTRATHIN LCD MONITOR
XTRAWIDE™ (170 DEGREE) VIEWING ANGLE ①
HIGH RESOLUTION, UP TO 1920 X 1200 ①
How real can an
real enough?

# Do you have the Big Blues over your IT infrastructure?

With fourteen operating systems, multiple chip architectures and a tangle of middleware to deal with, it's no wonder only IBM can "integrate" their systems. Which means you'll pay–and pay–for their monopoly on service. Because with their closed, complex systems, they control it all.

Interested in actually lowering your TCO (and who isn't)? Sun systems run on one chip architecture and a single operating environment, so you can scale from under-$1,000 desktop systems to over-$10-million data center systems without breaking a sweat (something you won't find at IBM). Imagine running the same applications, the same middleware (directory, portal, app server, etc.) and the same administrative framework across your entire IT environment. Now imagine using a single set of tools to develop those applications. That means no recoding, no retraining and no expensive consultants to come in and "manage" it all for you. You can even share the same system components between your midrange and data center-class systems. That's how you lower your total cost of ownership. Big time.

So you have two choices: a costly, closed and complex environment from IBM or one simple, cost-effective alternative from Sun. You decide.

take it to the n<sup></sup> Sun microsystems

©2001 Sun Microsystems, Inc. All rights reserved. Sun, Sun Microsystems and the Sun logo are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States and other countries.